DOCUMENT RESUME

ED 044 785 EA 003 132

AUTHOR	Bagley, Clarence H., Ed.
TITLE	Design and Methodology in Institutional Research. Proceedings of National Institutional Research Annual Forum (5th, Stony Brook, New York, May 3-4, 1965.)
INSTITUTION	Association for Institutional Research.
PUB DATE	65
NOTE	219p.
AVAILABLE FROM	The Association for Institutional Research, c/o Dr. Cameron Finchner Institute of Higher Education, University of Georgia, Athens, Georgia 30601 ($2.50)
EDRS PRICE	EDRS Price MF-$1.00 HC-$11.05
DESCRIPTORS	*Anthologies, College Faculty, Curriculum Research, *Higher Education, *Institutional Research, Methodology, Methods, Models, Planning, Student Research, *Symposia

ABSTRACT

This document incorporates all the papers presented at the fifth annual forum of the Association for Institutional Research. Whereas the previous forum reviewed the conceptual framework used in institutional research, this forum reviewed research design and methodology. Seven clinics carried out this theme with such topics as educational planning, educational technology, and curriculum research. Twenty papers covered such additional subjects as faculty, models and methods, students and curriculum, data collection, and information needs. A related document is EA 003 133. (The example on page 138 and table 6 on page 179 may reproduce poorly in hard copy because of marginal legibility.) (RA)

ED0 44785

DESIGN AND METHODOLOGY
IN
INSTITUTIONAL RESEARCH.

Finances Computers Faculty Planning Models Surveys Methods Grades Students

Space Curriculum

Proceedings of
Fifth Annual National Institutional Research Forum
State University of New York at Stony Brook
May 3-4, 1965

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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EA 003 132

1964 - 1965
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PREFACE

There is an increasing interest being shown in institutional research. The growing number of formal offices of institutional research and the increasing number of studies being undertaken by these offices are indices of that interest. Higher education and the administrators of institutions of higher education are requiring more and better information for use in decision processes. Persons presently involved in institutional research are seeking better methods and design. Institutional research is a multi-discipline, growing, changing, and demanding the necessary efforts for development of an emerging discipline.

The Fifth National Institutional Research Forum has as its theme the design and methodology in institutional research. The previous Fourth Forum had reviewed the conceptual framework for institutional research. Future forums, conducted as part of the Association for Institutional Research, will follow certain themes, expressing the concern of the members for better definitions, design and methodology, and research work. Thus the Forum continues to function as a resource meeting.

The forums follow the mandate of the membership to preserve the small and informal groups or clinics of the meetings. The maximum degree of individual interaction within the group can be integrated with research papers and speeches. The short time period of the Forum produced only a sampling of topics for presentation in the proceedings. Many different studies or reports could have been presented, however, the publication of the proceedings of this conference is limited to those papers presented during the clinics and general seminars on contributed papers. Some of the participants in the program did not choose to give papers for the proceedings while other participants were resource persons only.

The Forum was structured to provide seminars, contributed papers followed by discussion, and general discussion groups or special topics. The participation and discussion periods are thus acknowledged to be a vital part of the Forum but are not in the printed proceedings. The reader should familarize himself with the program to more fully comprehend the continuity of the papers.

Clarence H. Bagley
Editor

PART I

CLINICS ON INSTITUTIONAL RESEARCH METHODOLOGY

Faculty Load Studies

Robert McClintock, Director
Division of Institutional Research
University of Maryland

Enrollment Projections for Public Institutions

L. Joseph Lins, Professor and Coordinator
Institutional Studies
University of Wisconsin

Research Related to Campus Planning

E. F. Hallenbeck, Director
Institutional Research and Planning
University of Rhode Island

The College Student Questionnaires; Some Research Applications

Richard E. Peterson
Associate Research Psychologist
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Institutional Research on Curriculum

John A. Centra, Instructor
Office of Institutional Research
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Using the Document Scanner for Institutional Research

James Colney, Director
T. C. A. Center for Higher Education
George Peabody College for Teachers

Computers and Simulation as Aids to Educational Planning and Decision Making

Joseph N. Froomkin
Data Processing Division
International Business Machines Corporation

ROBERT E. McCLINTOCK
UNIVERSITY OF MARYLAND

It is not the purpose of this presentation to describe or compare the techniques of faculty load studies and analysis at various colleges and universities; I suspect that there are as many approaches as there institutions. Rather, I should like to describe briefly some basic concepts in approaching faculty load studies and illustrate how one institution has devised a method of making instructional load comparisons. Following this, I hope that some of those present will contribute experiences from their own institutions to provide contrasts and alternate approaches to this area of inquiry.

An axiom of design in architecture is that good structures are those in which form follows function. The same axiom is applicable to any aspect of institutional research -- including studies of faculty load. Obviously, there are a multitude of possible analyses that can be made from a pool of faculty and student data; the method utilized by any given institution should reflect the specific use to which the study will be put. In all cases the completed study should realistically attempt to fill the need or needs which caused it to be undertaken.

It is my personal opinion that a faculty load analysis should not attempt to be all things to all persons. Introducing too many factors can, in many cases, lessen its utility by making the study difficult to interpret. In the case of my own institution, the instructional load study is used along with studies of (1) class size, (2) analyses of types of instruction and variety of course offerings, and (3) estimates of probable availability of funds. We have not attempted to include all these things in a single analysis.

At the University of Maryland, the Instructional Load Comparisons is perceived as an administrative document. It was conceived and has evolved as a compilation of information intended to be used by the administration. Its growth and development have taken place along lines that make it more useful to the administration, without regard to any other use to which the study may be put.

Since this is an administrative document, its distribution is restricted to administrators at the various levels. I suspect that a majority of the teaching faculty have never seen a copy of the study and are only vaguely aware that it exists. The entire study is distributed to those members of the central administration who have the responsibility of preparing and administering the University budget and allocating faculty positions for the entire campus. In each of the eight colleges and schools on the College Park campus, the dean receives a summary for the entire campus plus all information relative to his unit and the departments which are contained in it. Each department head receives summaries for the campus and his college plus all information relative to his own department.

From the administrative viewpoint, each department is seen as manufacturing a product -- student-credit-hours of instruction. Each has a number of persons to produce this output -- the instructional faculty. The focal point of the study is the department rather than the individual faculty member. The specific tasks of staffing in terms of contact hours, the number of preparations, the number of students to be advised, usage of graduate assistants, and other operational considerations are considered to be a matter for the department to handle. This is highly desirable in a large, complex institution which possesses great variability of size and function among its departments. Allocation of teaching assignments in art, where studio instruction prevails, simply cannot be done on the same basis as in history, where lecture instruction is common. Individual departments must be given the responsibility and freedom to assign individuals in a manner which reflects the unique qualities of the discipline and the teaching techniques employed.

The faculty load study at the University of Maryland began a number of years ago as a routine report from the Office of the Registrar, giving the total student-credit-hours produced in each department. This was reviewed by the administration each year as was the number of faculty members teaching courses in each department. If one considers the nature of people and numbers, it is inevitable that someone should eventually divide one by the other to get a ratio. The outcome of this mathematical operation was the concept of expressing a department's teaching load as a "faculty quotient."

One of the first discoveries was that quotients varied from one department to another. This was not interpreted as evidence that some departments should carry heavier loads; rather, it gave rise to the assumption that different departments possessed genuinely different faculty needs in order to produce equal numbers of student-credit-hours. A basic rule has developed in considering faculty quotients -- NO COMPARISON IS MADE BETWEEN DEPARTMENTS. The only valid comparisons that can be made are those within a given department over a span of years. At this time the study necessarily assumed a longitudinal form.

The next problems to become apparent were those of graduate assistants, unfilled positions, and persons who did both teaching and research. At this point the study began to take into account the student-credit-hour production in relation to the number of teaching positions available to the department. At the University of Maryland the method of budgeting faculty salaries facilitates an easy identification of the portion of an individual's salary which comes from instructional funds as opposed to that portion which comes from research funds, administrative funds, or extension funds. This enables researchers to isolate with precision that portion of the total staff which is responsible for instructional purposes. Although I shall avoid using the term "Full-time Equivalent Faculty for Teaching," some of you may wish to think of it in that context.

The next step in development was the assignment of weights to the student-credit-hours produced at the various levels. The function of the weights was to differentiate among levels of instruction in terms of difficulty of preparation and instruction by the faculty. The weights selected were 1.0 for freshman and sophomore courses, 1.5 for junior and senior courses, 2.0 for graduate courses and supervision of practice teaching, and 3.0 for thesis supervision. The weights were initially determined as a consensus of judgments of the heads of departments; they are presently being evaluated on the basis of an empirical study. The introduction of weights significantly increased the value of the study since it enabled us to take into account varying distributions of level of teaching load among departments.

Table 1 and 2 are samples of output showing weighted credit-hour distribution for one department.

Table 1

DEPARTMENT OF MUSIC

WEIGHTED CREDIT-HOUR DISTRIBUTION SUMMARIZED BY COURSE LEVEL LOAD PER SEMESTER

YEAR	SEMESTER	LOWER DIVISION	UPPER DIVISION	GRADUATE DIVISION	RESEARCH	TOTAL
1955-56	FIRST	1,036	153			1,189
	SECOND	911	306			1,217
1956-57	FIRST	1,014	309	120		1,443
	SECOND	886	424	82		1,392
1957-58	FIRST	879	400	75	0	1,354
	SECOND	930	466	129	6	1,531
1958-59	FIRST	1,091	288	76	0	1,455
	SECOND	1,033	435	64	12	1,544
1959-60	FIRST	1,306	198	0		1,504
	SECOND	1,281	205	0		1,486
1960-61	FIRST	1,424	269	36		1,729
	SECOND	1,583	410	0		1,993
1961-62	FIRST	1,948	387	36		2,371
	SECOND	1,714	419	52		2,185
1962-63	FIRST	2,138	485	222	18	2,863
	SECOND	1,990	505	224	9	2,728
1963-64	FIRST	2,468	771	350	21	3,610
	SECOND	2,424	608	234	30	3,296
1964-65	FIRST	3,498	933	432	21	4,884
	SECOND	2,902	848	226	30	4,006
1965-66	FIRST			REGRESSION PROJECTION		4,945
	SECOND			REGRESSION PROJECTION		4,443
1966-67	FIRST			REGRESSION PROJECTION		5,512
	SECOND			REGRESSION PROJECTION		4,952

N.B. WEIGHTING FACTORS -- LOWER DIVISION 1.0
UPPER DIVISION 1.5
GRADUATE DIVISION 2.0
RESEARCH COURSES 3.0

Table 2

COLLEGE OF ARTS AND SCIENCES
WEIGHTED CREDIT-HOUR TOTALS, FACULTY POSITIONS, AND QUOTIENTS

	MICROBIOLOGY		MUSIC	
	FIRST SEMESTER	SECOND SEMESTER	FIRST SEMESTER	SECOND SEMESTER
1955-56				
TOTAL	1,678	1,366	1,189	1,217
FACULTY	6.3	6.3	7.6	7.6
QUOTIENT	265	216	157	161
1956-57				
TOTAL	1,489	1,494	1,443	1,392
FACULTY	6.1	6.1	10.8	10.8
QUOTIENT	245	246	134	129
1957-58				
TOTAL	1,616	1,548	1,354	1,531
FACULTY	6.1	6.1	11.3	11.3
QUOTIENT	266	255	120	135
1958-59				
TOTAL	1,577	1,926	1,455	1,544
FACULTY	6.1	6.1	11.8	11.8
QUOTIENT	259	317	123	131
1959-60				
TOTAL	1,664	1,598	1,504	1,486
FACULTY	6.8	6.8	12.0	12.0
QUOTIENT	244	234	125	123
1960-61				
TOTAL	1,603	1,340	1,729	1,993
FACULTY	6.6	6.6	13.5	13.5
QUOTIENT	243	203	238	148
1961-62				
TOTAL	1,532	1,634	2,371	2,185
FACULTY	7.4	7.4	14.6	14.6
QUOTIENT	206	220	162	149
1962-63				
TOTAL	1,753	1,893	2,863	2,728
FACULTY	7.1	7.1	17.2	17.2
QUOTIENT	247	267	166	159
1963-64				
TOTAL	2,276	2,060	3,610	3,296
FACULTY	8.4	8.4	21.0	22.1
QUOTIENT	271	245	172	149
1964-65				
TOTAL	2,594	1,908	4,884	4,006
FACULTY	9.8	9.8	26.8	26.8
QUOTIENT	265	195	182	149

At this time the rapid growth of the University and the increased complexity of the method of analysis began to make preparation of the study an extremely laborious and time-consuming effort. In an effort to counteract this, the study was shifted to a computerized form. However, the job is not yet one which is reduced to the "push-a-button-and-out-it-comes" state. The preparation of raw data to be inserted into the computer is still a difficult and time-consuming task, although the mechanized form has enabled researchers to produce elaborate analyses rapidly.

The most recent change in the study has been the introduction of future weighted-credit-hour production. We experiemented with several alternate methods of making future estimates including the use of simple linear trends, the use of percents of increase, and the use of regression functions. We are currently using a method which requires rather detailed predictions of future enrollments to be entered into a series of regression equations. We have found this method produces quite accurate estimates of departmental loads.

A modification in the weighting system is currently being investigated. The Evening Division and Off-Campus programs and Medicine, Law, and other professional schools of the Baltimore campus may be included in the analysis in the not too distant future.

The Instructional Load Comparisons has had a profound effect on many of the operations of the University of Maryland. In particular, its preparation has uncovered some shortcomings in the record-keeping and budgeting procedures. It has served as a good testing ground for potential changes in some of the operational procedures.

6/ 7

L. J. LINS
THE UNIVERSITY OF WISCONSIN

Making enrollment projections for any institution is not a simple assignment. As much care must be exercised in their preparation as is true of any research. The problem as well as its basic assumptions or postulates should be stated and defined. A hypothesis or hypotheses, after being formulated, should be evaluated in terms of agreement or lack of agreement with observed facts, and should be tested for logical consistency. After testing, each hypothesis is restated and retested. Objectivity is the keynote of this approach. There is no substitute for experience and well thought-out subjective judgments; however, research does not start with conclusions and proceed as a method to prove those conclusions. Research, and for that matter a carefully worked out enrollment projection, does not supplant the need for sound administrative judgment. It does, however, make that judgment better informed and more intelligent.

No college can use the presently available national projections of enrollment and/or college-age population as the best source of data for estimating its future college population. These estimates are correct in indicating that, collectively, higher educational institutions can expect substantial increases in enrollment. It is questionable, however, that these projections can be interpreted even nationally in terms of how much this increase will be. It is doubtful that state or institutional estimates will be as accurate when based upon national projections as when based upon conditions prevailing at the state or institutional level.

All factors related to the enrollment of a particular institution must be considered. These factors must be analyzed and, as far as possible, controlled in order to do the best job of forecasting. It is often assumed in national projections, for example, that the undergraduate college-age pool consists of individuals who are 18 through 21 years of age. Generally it is true that a greater proportion of college undergraduates are in this age range. It is questionable, however, that the enrollment in any undergraduate college or collection of colleges consists of an equal proportion of the youth at each of the ages 18 through 21.

It is evident that education beyond high school encompasses a much wider range than the four-year span immediately following high school graduation. The socio-economic change following World War II has varied the pattern of college attendance. Many persons older than the traditional college-age group are entering college for the first time or are returning to college for further education in order to compete in business, science, and industry. There has been an increasing emphasis upon post-baccalaureate education to meet the demands for better prepared persons in research and technological positions.

A second major problem in national projections of enrollment has been inadequate definition of a student. Definitions of enrollment and conceptions of what is requested on an enrollment questionnaire have changed. Not all institutions are using a uniform definition in reporting. Projections made from incomplete and unreliable basic statistics are subject to the inadequacies and limitations of those statistics. All too frequently there has been no distinction made between on-campus and extension center or branch campus students, between full-time and part-time students, between day and night students, or between regular class and correspondence students.

A third difficulty in national projections is that the system for making the national projections is frequently applied to the states within the nation. The migration of potential or actual students is not uniform from state to state nor are the population survival rates the same for all states.

Before making an enrollment projection, each institution should define its aims and purposes as carefully as possible and attempt to identify its long-range goals. Will the institution limit its enrollment, or is it committed to accept all individuals who meet certain general requirements? Will sufficient housing be available for the number of students who might desire to attend the institution? Is the anticipated building program adequate to provide the necessary instructional facilities? Is it possible to secure sufficient qualified staff members? Will there be changes in the size of the area to be served? What changes may be anticipated in admissions requirements? Will there be changes in present programs or new programs added?

More general factors should be kept in mind also. Can changes in the economic structure of the patronage area be anticipated? Is there evidence that an increasing or a decreasing per cent of high school graduates will seek higher education? Can one detect tendencies for colleges within the area or in other states to restrict enrollment? Will a higher proportion of students continue for post-baccalaureate work?

These are only a few of the questions which the person making an enrollment forecast should attempt to answer prior to making the forecast. If definite answers are not possible, a framework of logical assumptions should be set up using the best data available.

One notes from the above questions that the projection of enrollments is not merely a statistical problem. In enrollment projection, the statistical study of past enrollment records must be supplemented by knowledge which may be quite nonstatistical in nature. College enrollments are dependent upon upon a large number of complex factors which are difficult to analyze. Some factors which affect the size of college enrollments are changes in economic and international situations, birthrates, provision of educational benefits and/or loan and scholarship programs, high school enrollments, unusual migration, changes in mortality rates, and Selective Service drafts and deferments.

Persons making enrollment projections cannot be aware of the future operation of all factors; consequently, some error in projection might be expected. It is a continuous responsibility to make and revise enrollment projections.

Throughout I refer to projections or forecasts rather than predictions. The projection represents a normal or mean trend during the period of projection and is based upon specified assumptions. For any given year within the forecast period, it can be expected that the actual enrollment may fall above or below the projected trend line. However, if the projection is a good long-range projection, the total positive errors should be about the same as the total negative errors about the trend line. In making projections, it is well to anticipate the variations through projecting a high, medium, and low enrollment number for each point (year) for which a forecast is made.

I would like to distinguish also between potential and estimated enrollment. Potential enrollment is used in long-range facility planning to indicate the number of college students which the institution might attract from the total persons expected to desire a college education in a geographic area should factors such as facilities, staff, distribution of enrollments among the institutions serving the area, and admissions and retention rates follow the pattern of the assumptions relative to these factors. Estimated enrollment is used in short-range instructional and budget planning and is determined by factors such as the facilities and staff currently available or expected to be realized during the forecast period and the size of the current student body by class.

It has been indicated that the forecast is based upon a well thought-out formulation of assumptions. Unless this is true, the forecast may be mere guesswork or speculation. A large amount of reliable, detailed, and relevant data upon which to base the assumption is essential. Good forecasts will call for logically integrated, analytical techniques.

Thorough consideration should be given to the purpose of the forecast prior to collecting data and formulating assumptions.

If the purpose of the forecast is to determine future instructional staff needs, there should be a clear definition of faculty effort (sometimes called work load) and a knowledge not only of the mean number of credits per student but also of the relative sizes of classes. Facts should be available on the number and distribution of credits carried by full-time and part-time students as well as the time of day students desire and can attend classes. It may be necessary to define students and faculty in terms of full-time equivalents.

The person making the enrollment projections must be aware of the purposes and plans of the institution for which the projection is made. He therefore should be informed of administrative decisions as those decisions are being made. These decisions are related to the conditions over which the institution has control. A college, for example, can control the size of its student body through an arbitrary ceiling on admissions, through increased tuition and/or fees, through higher admission and academic standards, through adjusting the proportion of in-state to out-of-state students admitted, through changes in the academic offerings, etc.

There are, however, conditions over which the college has little or no control. Among these conditions are population changes and shifts in population, military crises, economic change, and modifications of the social structure. If, for example, there is a sudden shift toward higher educational requirements in the labor force or if employers give increasing priority to job applicants with a college education, the potential demand for college education will be increased.

A sudden upward shift in a state's economy usually results in more college applicants. On the other hand, numerous institutions have found that during the first years of a recession or depression there is a tendency for more students to seek college admission; if the depression continues, it can be expected that there will be a downward shift in college attendance unless scholarship and loan programs provide the funds not otherwise available. Several recent studies have indicated that the proportion of academically qualified students who will attend college is more closely related to the education of the parents than it is to the wealth of the families. Thus if, within the area from which the students are drawn, there are industrial changes which cause a shift in the amount of education of the labor force, it can be expected that there will be a change in the proportion of high school graduates who will attend college.

Sources of Information Relative to Population and College Enrollments

There are numerous sources of information relative to population and college enrollments. Before any of these sources are used, it is essential to discover whether the available information is applicable to the college or collection of colleges for which enrollment projections are desired. Some sources of population and enrollment data are:

1. Department of Commerce, Bureau of the Census, Washington, D. C.

2. National and state educational associations, regional boards, and coordinating committees for higher education. The organization of state agencies and the information available may vary from state to state.

3. Philanthropic foundations.

4. Insurance companies. Particularly useful may be the mortality or survival tables.

5. The U.S. Office of Education, Department of Health, Education, and Welfare, Washington 25, D. C. It should be kept in mind that the enrollment data presumably includes all students taking work creditable toward a degree; consequently, the enrollment data may be more inclusive than is desired for a particular projection.

6. Some states have an agency which collects enrollment data from all colleges within the state; quite frequently this is done by a representative of the regional association of the American Association of Collegiate Registrars and Admissions Officers.

7. State and national departments of public health (Vital Statistics).

8. The office of the Register of Deeds of the various counties--birth records.

9. Various institutional bureaus of research or offices of institutional studies.

10. State departments of education. Many state departments of education have only public school--elementary and secondary--enrollment figures. In some states, it is very difficult to obtain the enrollment count for private elementary and secondary schools.

11. The American Council on Education, 1785 Massachusetts Avenue, N.W., Washington, D. C.

12. The reports of Ronald Thompson, The Ohio State University.

   a. Enrollment Projections for Higher Education, 1961-1978 (The American Association of Collegiate Registrars and Admissions Officers, September 1961), pp. xi + 36.

   b. "To Solve the Problem of Rising College Enrollments" (P.O. Box 311, Yonkers, New York: The College Blue Book, 1959), pp. 919-934.

   c. "The Problem of Rising College Enrollments" (P.O. Box 311, Yonkers, New York: The College Blue Book, 1957), pp. 18.

   d. The Impending Tidal Wave of Students (The American Association of Collegiate Registrars and Admissions Officers, October 1954), pp. 48.

   e. College Age Population Trends, 1940-1970 (The American Association of Collegiate Registrars and Admissions Officers, January 1954), pp. ii + 69.

Thompson's publications are useful if one is concerned with a general measure of enrollment potential. However, the reports are more useful on the national level than on the state or institutional level and have some limitations. Weighting was not done by age even for the narrow age-range used. Adequate correction for migration and mortality also was not made. The most significant contribution of these publications has been that they have emphasized the need for long-range educational planning and for immediate consideration of providing for rapidly increasing enrollments.

13. Student migration reports.

   a. Residence and Migration of College Students, Fall 1963 (Washington, D. C. 20202: U.S. Department of Health, Education, and Welfare, Office of Education, July 1964).

   b. A Supplement to Home State and Migration of American College Students, Fall 1958 (The American Association of Collegiate Registrars and Admissions Officers, December 1959), pp 41.

   c. The Home State and Migration of American College Students, Fall 1958 (The American Association of Collegiate Registrars and Admissions Officers, March 1959), pp. 60.

   d. Story, Robert C., Residence and Migration of College Students, 1949-50 (Washington 25, D. C.: Federal Security Agency, Office of Education, 1951), pp. vi + 61.

Enrollment Projection Techniques

There are four methods in use for making enrollment projections: (1) curve-fitting, (2) ratio, (3) cohort-survival, and (4) correlation analysis. In practice, the best technique for a particular institution or state or the nation may be a combination of these methods. A few years ago, I asked a representative of each state in the United States to forward institutional and state enrollment projection reports to me. The most frequent technique used in these reports, whether for institutional or state purposes, was the ratio method.

CURVE-FITTING METHOD

Enrollment projections by the curve-fitting method consist of determining the functional relationship which exists between past enrollments and years. This functional relationship then is projected to the year or years for which the potential enrollment number is desired. It is assumed that enrollment trends, based upon historical enrollment data, will continue and that the influences of the recent past are indicative of the factors which will operate in the future. The enrollment of the past according to time may take the form of one of many curves.*

RATIO METHOD

The ratio method determines the ratio between the persons enrolled in college and the college-age population of which those persons are a part. This method has been used widely but, as generally employed, is inferior to the cohort-survival method. The ratio method can be, but seldom is, used to forecast freshman, sophomore, junior, senior, etc. enrollments separately. More generally the ratio used is that of the division of the total college enrollment by the total college-age pool defined as all individuals in a geographic area who are 18-21 years of age or 18-24 years of age.

An age pool in which each age is given equal weight more frequently than not is a poor representation of the population from which the students come since the proportion of students at each age in any given institution is rarely the same. A better estimate can be made by weighting the population by age according to the relative weighting of ages within the college enrollment grouping.

To employ the ratio method, it is necessary to have past and present data relative to the number of individual in the college-age range, which is representative of the college enrollments, and to have historical information concerning the weighted proportion of the college-age range population which attended the college or collection of colleges for which the projection is being made. There should be separate projections for undergraduate and for post-baccalaureate--graduate and professional--students.

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*L. J. Lins. Methodology of Enrollment Projections for Colleges and Universities (Washington, D. C.: American Council on Education, c. 1960), pp. ix + 67.

The enrollment grouping for which the projection is desired must be analyzed carefully over a period of years. The sex distribution by age and by class should be determined. In order to discover the population to be used as a basis for the projection, the enrollment should be distributed according to the geographic areas from which the students come. These areas may be high schools for the commuting college or counties or parishes for the college attracting students from wide areas; the area may encompass a number of states. When the area or areas from which the students come is determined, the next step is to evaluate whether or not there has been a consistent pattern in the distribution of students by area. The present college-age population of the area or areas and the anticipated college-age population should be known. The latter may be based upon births corrected for deaths and migration. The college-age population figures are weighted according to the proportion of students from each area by age.

COHORT-SURVIVAL METHODS

The word "cohort" is used to designate a group of individuals having a similar classification trait. The cohort-survival technique is a method based upon the extent to which a group of individuals survives by grade from first grade through college (grade-succession) or upon the extent to which a group of individuals survives by year of age from birth through the age of college graduation (age-survival). In the ratio method, for each calendar year one ratio is computed between the college-age pool and the persons enrolled in college. In the cohort-survival method a system of ratios is set up to determine the college enrollment for each calendar year; for example, in the grade-succession method, respective ratios of second grade to first grade, of third grade to second grade, of fourth grade to third grade, etc., are computed. Thus the cohort of a particular year is followed through grade succession until the senior year in college and perhaps on to post-baccalaureate college years.

COMBINED RATIO AND COHORT-SURVIVAL METHOD

For many institutions a grade-to-grade or an age-to-age survival technique is not sufficiently superior to a simpler and less cumbersome combined ratio and cohort-survival method to warrant the extra effort. If the problem is to project enrollments through all levels of education from first grade through college, then there seems to be no reasonable alternative to a complete grade-to-grade or age-to-age survival method. However, if the problem is only one of projecting college enrollments, it may be satisfactory to set up direct experience ratios of survival from birth to 17, 18, and 19 year olds. This assumes that the new freshman class in a college is composed primarily of 17, 18, and 19 year olds from a readily identifiable area. The ratio of freshmen to the population of 17, 18, and 19 year olds weighted according to the proportion of 17, 18, and 19 year olds among the new freshmen is determined for the past few years. This procedure, through building up an experience trend over a period of years, automatically considers the factors of mortality, migration, and desire for college attendance. The assumption is made that the effects of mortality, migration, and desire for further education in the future will be the same as in the past.

From the new freshman enrollment, a cohort-survival (grade-succession) method is used to determine the size of the sophomore, junior, and senior classes.

CORRELATION ANALYSIS

The correlation analysis method is an attempt to determine the association between enrollment (dependent variable) and one or more independent factors or variables. It may be found, for example, that university or college enrollment varies concomitantly with the number of high school seniors and per capita income. The variation in enrollment may be closely related to a single variable or to a combination of variables. In any event, zero-order coefficients of correlation would be computed between the dependent variable of enrollment and each of the several independent variables. If it is found that there is a significant concomitant association between the dependent variable of enrollment and two or more of the independent variables taken separately, a correlation matrix consisting of the intercorrelations should be set up.

Short-Range Estimates of Enrollment

The primary purpose of a short-range estimate of enrollment is to provide an annual or biennial basis for budget preparation and educational planning. At the institutional level this may involve college or school, class, and departmental estimates of enrollment.

In my own short-range estimates, I estimate by class, sex, and college or school with current entrance divisions of continuing, reentering, advanced standing, and new. A combined ratio and cohort-survival method is employed. New freshmen (residents of the state) by sex and college or school are estimated for the Madison campus by developing the ratio between new freshmen and the weighted 17 and 18 year olds in the state as of April 1; this is practical since the Madison campus attracts students from all area of the state. By policy, the Madison campus accepts one non-resident new freshman for each two resident new freshmen; therefore the estimated number of resident new freshmen is merely multiplied by 50 per cent to arrive at the estimated number of non-resident new freshmen.

For the University of Wisconsin-Milwaukee, the ratio method also is used, but the ratio is one between new freshmen and Milwaukee high school graduates, since the UW-M is primarily a commuting institution and only about 1.5 per cent of the new freshmen are non-residents of the state. There is an additonal problem, however, in that about 19 per cent of the UW-M undergraduate students are evening part-time students.

The continuing, reentering, and advanced standing students by class, sex, and college or school then are computed using the cohort-survival technique. In all phases of the estimation, policy changes are reflected in the estimates.

Long-Range Projections of Enrollment

Unless there are drastic changes downward in economic and social conditions, changes in mobilization patterns, and changes in the desire of the college-age youth to attend college, it can be expected that there will be a continuing increase in collegiate enrollments. The present increase in enrollments is due at least in part to an increasing population, particularly in that part of the population which is of college age, and to an increasing proportion of the population which actually attends college.

During the years since World War II, the birth rate has risen. The increased number of births is only one of the factors contributing to larger enrollments. At the present time, economic conditions are favorable, there is an increasing demand for college graduates, and there is a marked tendency in the direction of increased family size among college-educated parents. It is known that a larger proportion of children whose parents have a college education attend college than of children whose parents do not have a college education.

There must be continuous careful planning for increased college enrollments. Each state, and institution within the state, must analyze its enrollment potential and, on that basis, must plan as thoroughly as possible the means for serving its students. For some institutions, this will involve the construction of many new buildings; however, brick and mortar alone will not suffice to guarantee high quality education. The need for instructional staff also must be recognized. It not only is necessary to prepare the persons who desire to become teachers but it also will be necessary to make the teaching profession sufficiently attractive to hold the present teachers and to attract a larger proportion of college graduates to teaching.

For some institutions, instructional and administrative costs are directly related to enrollment size. In other institutions, particularly those with large evening and/or part-time programs, total enrollment is a quite unsatisfactory basis on which to estimate instructional costs. In all institutions, a better index for budget preparation may be faculty effort (load) data and number of credits taught. The number of students enrolled in a particular college or school within a university, for example, may be little related to the number of credits taught or students served by that college or school.

Departmental budgets usually are more closely related to student credit loads and adviser loads than to the number of students classified in the department. The problem of defining, measuring, and estimating faculty work effort and of measuring and estimating credits taught and building facilities could be the subject of an entire conference. The University of Wisconsin, in cooperation with consultants from some other universities, currently is involved in developing a computational model for space studies. This is through a grant from the U.S. Office of Education. The project is termed CRISP--Cooperative Research Interinstitutional Space Project.

That increases in enrollment can be expected is important in alerting the people of this nation to the needs of higher education. Even more important are educated projections of how great the enrollment increases might be at any particular time. Enrollment projections must be based upon the best possible data supplemented by a set of well-integrated and well-founded basic assumptions. The data as well as the assumptions will vary from state to state and from institution to institution. It is recognized that no single method of long-range enrollment projections will meet the needs of all states or all institutions. The method to be used must be determined by persons who have a good background in projection theory, who understand demographic data, and who are aware of the educational needs of the particular state or institution. The projections should be reviewed and, if necessary, revised periodically in order to take into account changing conditions.

The validity and reliability of enrollment projections are somewhat related to the size of the population area and to the length of the projection period. As the size of the population area is decreased and as the length of the projection period is increased, the reliability of the projection generally decreases. Thus long-range projections for a state are usually more reliable than for a city or county. Also projections 10 to 15 years into the future are less reliable than are projections for a shorter period of time. In a small population segment, very rapid changes in migration, mortality, and economic conditions may occur; these changes usually occur more slowly in an entire state, for the loss through migration in one area may result in an increase in population in another area.

Enrollment projections can be made as far as 17 years into the future without estimating births. Nearly all individuals who will be enrolled in colleges and universities 17 years from now are born and can be counted.

Data Presentation

Both the background data on which enrollment projections are based and the projections themselves generally will appear in some type of duplicated or printed report. One of the prime principles in data reporting is that the materials should be presented candidly and honestly. The presentation should be understandable to the persons who are expected to use the report; therefore, the report with its accompanying tables and graphs should be "crystal clear." No matter how carefully enrollment projections are made, if the technique and the results are not presented in a succinct and comprehensible manner, there is the possibility that the persons who have the responsibility for final institutional decisions will distrust and perhaps disregard the generalizations and conclusions reached.

Various techniques of presentation should be used. Some persons are able to read tables with ease. Other individuals see the data best when presented in diagrammatic form. The advantages of a written page accompanied by a well designed, clear graph is somewhat synonymous to the advantages of a presentation using audio-visual materials rather than using mere verbalization.

It should be kept in mind that college administrators and members of boards of regents or boards of trustees are persons confronted with many elaborate reports each day. It is impossible for them to read all the materials which come to their desks; therefore, if the report can be brief, it is more subject to notice. Also, an attractive and well presented chart or graph may more clearly convey a thought which might not be understood when presented only through many minutes of verbalization or many pages of written material.

EDWIN F. HALLENBECK
UNIVERSITY OF RHODE ISLAND

The character and environment of a college campus are established in a large part by its architecture. When one visits, works or studies at a college or university, one is immediately aware of and affected by the architecture. C. W. Brubaker of Perkins and Will has noted that architecture "can help or hinder, inspire or inhibit--it can create an atmosphere of dignity and decorum, or excitement and enterprise, or of anticipated adventure and discovery. You cannot think of a college without visualizing its architecture."

The Planning Process -- A planning process must continually operate at two levels: first, for the insitution as a whole, and second, with particular application to each building project. Careful review of the general philosophy and the specific objectives of the institution should be made and clarified to pinpoint a common understanding and acceptance of goals.

Implementation of both insitutional and project goals involves careful and detailed study. This must be a multifaceted undertaking involving many people within the institution, although responsibility for coordinating the effort should be assigned to a major college official, either the president or one of his immediate subordinates. Considerations should include: (1) programs -- educational, research, or others needed to meet goals; (2) organization required to put programs into action; (3) personnel -- including faculty, administrators, and others necessary to staff the programs; (4) facilities needed to provide a place for the development of programs; and (5) a financing study needed to document the budget requirements and resources for the college and for each project.

To do this in proper perspective for successful implementation of each project requires careful long-range planning, for without a master plan sooner or later campus chaos will result. With a master plan, however, a coordinated well conceived network of facilities can aid beyond measure in implementing the quality of the educational programs desired.

The Building Sequence -- There are many problems specifically related to facilities planning projects. The first problem generally overlooked and seldom appreciated, is the building sequence, which involves many people, substantial effort, and -- most important for impatient building inhabitants -- time. Assuming that one has a general college master plan already formulated, and average time sequence for the many college building projects might follow this outline:

Building Project Schedule

I.	A.	Need analysis	3 months
	B.	Study and commitment	3 months
	C.	Programming	3 to 6 months
II.	A.	Securing architect	2 months

III.	A.	Preliminary design studies	2 to 3 months
	B.	Basic drawings and outline specifications	3 to 4 months
	C.	Working drawings and specifications	6 to 8 months
IV.	A.	Bidding	1 to 2 months
	B.	Award of contract	1 month
V.	A.	Construction period	15 to 18 months
	B.	Occupancy	1 month
		TOTAL NUMBER OF MONTHS	50 months

The four-year period indicated in the Building Project Schedule shows clearly the many complicated steps from need to use. While some shortcuts are possible, delays are also frequent and unpredictable. One can apply the following formula to any building project.

Date needed - No. of months in unfinished steps = Where you should be now!

Programming -- Of all the steps in the building sequence, programming is by far the most critical. The success of any facilities planning project depends on how clearly and how well the college presents the needs for the project to the architect. The program document must state the case as the first step in translating academic needs into architectural requirements. The program for a project on each campus must reflect its own particular need, but, at the same time it must go beyond and state how much innovation one is going to ask the architect to work with.

In preparing the program, the planning process noted earlier may be followed to generate much useful pertinent data. A clear, brief statement of what the structure is expected to do will be helpful. Four kinds of information are needed in the program. First, space requirements should be stated in detail in terms of net usable square feet required for each function and space. Second, kind and quality of equipment and furnishings within the spaces must also be defined. Third, relationship of areas within the building needs definition, including clusters of spaces that must work together. Fourth, relationship to campus and other buildings underscores the part each project plays in the total campus master plan.

The program document, to be the most useful, should be an evolutionary working paper. Basically, it is a description of space as one wants to use it. Then, translating it into physical shape is the architect's responsibility. The first step for the planner is writing a general outline of requirements and relationships. The second step is a review with all involved parties. Early involvement of the architect, by including him in development of the program at this point, will facilitate the project. The draft program should also be reviewed by faculty and other building users, campus physical plant and construction personnel, and specialized consultants, all coordinated through the college's planning office.

At this point, preliminary schematic studies begin, followed by basic design studies. Finally, all elements in the program can be further refined and innumerable details added.

Project Cues -- One of the most difficult obstacles to overcome in any building project is emulation. This practice has both good and bad points. At its worst it can perpetuate mistakes of a generation ago, while at its best it can result in acceptance and use of the newest experiments in facilities design. Practiced selectively and carefully, and following the programmed concepts of the building, many ideas in use elsewhere can be successfully adapted. Educational Facilities Laboratories deserve thanks for their vigorous effort to encourage experimentation, evaluation of results, and most important, publication of the findings. Every college and university planning office should have a copy of every EFL publication, including those dealing with lower schools. Many useful ideas and concepts have been described. Seldom, however, can they be used by direct application, and they will require careful translation into designs to meet your own particular needs.

Two other practices are also helpful. Regular reading of architectural literature and other publications can be quite worthwhile. It must be noted that many projects are published because they are unusual. While this distinction does make them of interest, it also means more often that they are difficult to translate into other environments. Therefore, caution must be observed and emphasis placed upon adaptation of ideas and design concepts rather than actual detail design solutions. The second practice is visiting other facilities, usually those recently completed. Although it can be stimulating and very rewarding, this too has its hazards. Great care must be exercised in evaluating any facility visited in terms of the programmed purpose of the building in its local context. Do not judge another college structure by the bench marks for your campus, as the goals may be radically or subtlely different. This applies both to exterior and interior. Here again, study a building for the concepts and functions it performs well with a view toward translation for meeting your own needs.

A brief summary of some concepts pertaining to specialized categories of facilities follows:

1. Teaching space, where the formal instructional activity involving faculty and students is centered, needs to be broken out of the academic box in college in much the same way that architect William Caudill has done for the lower school. Although it is not reasonable to generate large loosely defined teaching areas for college classes, the arrangements possible need greater variety and quick adaptability than the traditional forty student classroom offers. There are many things that are done much more effectively in large groups, and others in small groups sometimes with no faculty supervision. To handle larger numbers of students, it is not feasible or economically sound to generate enough space to answer all needs at once. A functional modular concept can be adopted to lend both variety and flexibility to classroom use. For example:

a.	Small groups	12 to 18 students
b.	Medium groups	25 to 40 students
c.	Large groups	50 to 80 students

By designing space clusters as Perkins and Will have done at Chicago Teachers College North, one may split the medium group space to form two small group spaces or may combine it with another to form one large group space. Classes may then be assigned to fit spaces which may in turn be adjusted to meet class size when appropriate. Space utilization may be considerably increased, thus requiring less rooms to be constructed. Special large group teaching spaces fully equipped with audio-visual and video equipment will have rapidly increased use, especially for basic courses in almost all departments, and should be considered a part of all teaching space planning.

2. Individual study space is a common need of all students in all colleges, city commuting or country residential. Study spaces should be created where students will use them: in libraries, residence halls, classroom areas or other likely spots. Study spaces should afford privacy and be electronically accessible to the campus academic nerve center.

3. Faculty office space for some reason has frequently been ignored or solved by the egg crate pattern. The needs of faculty, who seldom spend more than 12 to 15 hours a week in classrooms, are very much like the requirements of the executive and corporate office inhabitants. A similar approach to a design solution would seem appropriate, basically the creation of space within a structure with the walls looked upon as equipment changing perhaps annually as faculty are added and departments shifted. Attention should be paid to meeting the group needs of departments as well as the private needs of individuals.

4. Laboratory space is a monumental problem because of the size and expense involved. Scientific demands for space and equipment are never ending. Worst of all, scientists all too often request space for current and short range needs in the most rapidly changing quarter of the college. Laboratory space, especially that used for research should be modular, permitting changes in utilities and walls with maximum ease. A scientific project may be there tomorrow and gone the day after, replaced by a new problem. The space should change with the projects without reconstruction of the building.

5. Libraries are really instructional material centers and may quite appropriately include audio-visual centers to aid in the preparation of teaching materials, computer centers to aid in research and information retrieval, and places to study, type, listen and perhaps relax.

6. Arrangements for part-time students and faculty have always been a problem largely ignored. As colleges expand more rapidly, the number of part-time participants will inevitably grow. Ways must be found to integrate these people as fully into the college's life as the full-timers. Student study space has been noted. Faculty space could be approached by designing a special area with a desk drawer and file drawer for each individual with the rest of the facilities to be shared. A seminar room nearby could be used for conferences, either group or individual.

7. Residence needs for students will be considered in more detail through a case-study review of a recent project at the University of Rhode Island, Kingston, Rhode Island; architect, Pietro Belluschi, Sasaki, Walker and Associate, and Kent, Cruise and Associates in joint venture. The Housing Complex is an example of careful programming and design to meet student

needs in a large scale project in human scale design. For details see Progressive Architecture, January, 1965, where the Housing Complex received the First Design Award in the 12th Annual Design Awards Competition.

To conclude, the importance of the task of facilities planning and design will be reflected in the structures we create. In the long run college buildings are only as good as the work they can perform for the people who live and work in them.

RICHARD E. PETERSON
EDUCATIONAL TESTING SERVICE

Some small amount of biographical and demographic information has been required of entering students by many colleges for many years. While such information has undoubtedly been put to a variety of uses, biographical data on students have seldom loomed large in institutional studies, at least when such studies have been published in reports to the educational research community.

There is wide evidence, however, that research interest in biographical, attitudinal and other "noncognitive" characteristics of college students is waxing. The Vassar studies (9) and the publication of *The American College* (10) have been important stimuli. In briefly summarizing recent work in this field, it is useful to delineate four broad categories of institutional studies which involve biographical data, *to wit*, descriptive, predictive, longitudinal, and instructional.

While biographical data may be used in a great variety of essentially *descriptive* studies, perhaps the most notable research in this category has involved large numbers of institutions. For example, Astin (3) has characterized some 1015 institutions using, among other kinds of information, student responses on a 25 item Freshman Information Form. In Oklahoma, a study was recently made of biographical and demographic characteristics of freshmen, and the relationship of these factors to early withdrawal, for the 32 colleges in that state (8). The NORC study, *Great Aspirations* (5), falls into this category of descriptive studies.

Secondly, there is a surge of interest in using biographical data in *prediction* studies. Anastasi, et al (2), for example, reported relatively high correlations between scores on an 86 item Biographical Inventory and a multidimensional criterion of success at Fordham College. More recently, Aiken (1) reported relative success in predicting both freshmen grades and early withdrawal by means of groups of biographical questions.

A third general area in which biographical data have figured strongly is that of longitudinal study of student change. Well known examples are the Bennington and Vassar studies (7, 9), the work of Murphy and Raushenbush at Sarah Lawrence (6), and the eight college study of the Berkeley Center for the Study of Higher Education currently nearing completion.

Finally, a particularly noteworthy application of biographical information is embodied in the work of Danskin, et al (4), whose objectives at Kansas State University has been to spell out the implications that student biographical and attitudinal data have for curriculum and instruction.

The activities mentioned above are indicative of some of the kinds of research involving biographical data that has been carried out, most of it reported in the past five years. The major purpose in the pages to follow will be to review a variety of potential applications of student biographical and attitudinal data, while focusing on a newly published instrument for gathering such information.

Nature and General Purpose of the CSQ

The College Student Questionnaires have been developed for use by institutional researchers as a means for gathering and processing large amounts of diverse information about college student bodies for a variety of research purposes. Information elicited is for the most part biographical and attitudinal. While the questionnaires are likely to be of widest use in institutional self-study and planning, they may also provide social scientists and educators with data that bear on questions of a more basic nature.

There are two questionnaires--Part 1 and Part 2. CSQ Part 1 is for administration to entering students (freshmen, transfers) prior to the formal beginning of the academic year.

CSQ Part 2 is for administration to any group of undergraduates toward the close of the academic year. Sections I and IV from CSQ Part 1 duplicate Sections I and III from Part 1. The middle section of Part 2 consists of some 100 questions dealing with what might be called "student functioning," i.e., activities, perceptions, and satisfactions as students at a particular college. A major purpose in constructing overlapping instruments is to enable study of student change during the college years. An outline of the item content of both questionnaires is given below in Figure 1.

OUTLINE OF THE ITEM CONTENTS OF THE COLLEGE STUDENT QUESTIONNAIRES

CSQ PART 1

Section I: Educ. and Voc. Plans

1. Basic demographic data; sex, age
2. Status as student: class, residence
3. Educational plans; major, graduate work
4. Vocational plans
5. Financial support
6. Anticipated activites, rewards, problems

Section II: Secondary School Information

1. Type, size of secondary school
2. Estimated level of aced. achievement
3. Perceptions of various course work
4. Extracurricular activities
5. Perception of motivation for grades
6. Leisure time activities

Section III: Family Background

1. Location of home and birthplace
2. Parents' status: together, divorced
3. Family size; birth order
4. Parents' occupations
5. Family income
6. Parents' education
7. Racial, ethnic, nationality factors
8. Religious preferences
9. Parental concern for education of respondent
10. Political and cultural characteristics

CSQ PART 2

Section I: Educ. and Voc. Plans

Identical to Section I in CSQ Part 1, except no questions about anticipated activities, rewards, problems (#6).

Section II: College Activities

1. Extracurricular activities
2. Attitudes re: faculty and student-faculty relations
3. Attitudes re: administration and administrative rules and regulations
4. Sources of satisfaction and problems
5. Fraternity-sorority considerations
6. Estimated grade average
7. Study techniques and attitudes
8. Leisure time activities
9. Outside reading preferences
10. Attitudes about the student body
11. Attitudes about work in major field

Section IV: Attitudes

1. Respondent's religious preference
2. Instructional preferences
3. Attitudes re: independence from family
4. Attitudes re: independence from peers
5. Political attitudes
6. Attitudes reflecting social conscience
7. Activities reflecting cultural sophistication

Section III: Attitudes

Identical to Section IV in CSQ Part 1

Figure 1

In addition to analysis at the item level, the CSQ may also be scored on 13 scales. With one exception each scale consists of 10 four-alternative items. Five of the scales are included in both Part 1 and Part 2. Scale designations are given below; brief definitions are given in Figure 2.

CSQ Part 1

MG	Motivation for Grades (experimental)
FS	Family Social Status (five nine-option items)
FI	Family Independence
PI	Peer Independence
L	Liberalism
SC	Social Conscience
CS	Cultural Sophistication

CSQ Part 2

SF	Satisfaction with Faculty
SA	Satisfaction with Administration
SM	Satisfaction with Major
SS	Satisfaction with Students
SH	Study Habits
EI	Extracurricular Involvement
FI	Family Independence
PI	Peer Independence
L	Liberalism
SC	Social Conscience
CS	Cultural Sophistication

Comparative data drawn from CSQ administrations to approximately 20,000 students at 39 institutions are currently available for both items and scales. This pool of comparative data is regarded as preliminary and will be expanded and variously organized as the questionnaires gain wider usage.

An important caution: the CSQ is not designed to assess or diagnose individuals as such. It is to be used in an essentially survey fashion--to describe groups of students. Responses of a single individual to questionnaire items are very often undependable. The scales in the CSQ are short and heterogeneous of content, and hence relatively unreliable for individual appraisal. (Internal consistency reliabilities of the scales are in the 60's and low 70's.)

In summary, the CSQ represents an institutional research tool comprised of two questionnaires, comparative information, and an economical system for tabulating, scoring, and reporting.

BRIEF DEFINITIONS OF THE SCALES IN THE COLLEGE STUDENT QUESTIONNAIRES

(SF) Satisfaction with Faculty refers to a general attitude of esteem for instructors and the characteristic manner of student-faculty relationships at the respondent's college. Students with high scores regard their instructors as competent, fair, accessible, and interested in the problems of individual students. Low scores imply dissatisfaction with faculty and the general nature of student-faculty interaction.

(SA) Satisfaction with Administration is defined as a generally agreeable and uncritical attitude toward the college administration and administrative rules and regulations. High scores imply satisfaction with both the nature of administrative authority over student behavior and with personal interactions with various facets of the administration. Low scores imply a critical, perhaps contemptuous view of an administration that is variously held to be arbitrary, impersonal, and/or overly paternal.

(SM) Satisfaction with Major refers to a generally positive attitude on the part of the respondent about his activities in his field of academic concentration. High scores suggest not only continued personal commitment to present major field, but also satisfaction with departmental procedures, the quality of instruction received, and the level of personal achievement within one's chosen field. Low scores suggest an attitude of uncertainty and disaffection about current major field work.

(SS) Satisfaction with Students refers to an attitude of approval in relation to various characteristics of individuals comprising the total student body. High scores suggest satisfaction with the extent to which such qualities as scholastic integrity, political awareness, and particular styles and tastes are perceived to be characteristic of the student body. Low scores imply disapproval of certain characteristics that are attributed to the over-all student body.

(SH) Study Habits refers to a serious, disciplined, planful orientation toward customary academic obligations. High scores represent a perception of relatively extensive time devoted to study, use of systematic study routines and techniques, and a feeling of confidence in preparing for examinations and carrying out other assignments. Low scores suggest haphazard, perhaps minimal, attempts to carry through on instructional requirements.

(EI) Extracurricular Involvement is defined as relatively extensive participation in organized extracurricular affairs. High scores denote support of and wide involvement in student government, athletics, religious groups, preprofessional clubs, and the like. Low scores represent disinterest in organized extracurricular activities.

(FI) Family Independence refers to a generalized autonomy in relation to parents and parental family. Students with high scores tend to perceive themselves as coming from families that are not closely united, as not consulting with parents about important personal matters, as not concerned about living up to parental expectations, and the like. Low scores suggest "psychological" dependence on parents and family.

(PI) Peer Independence refers to a generalized autonomy in relation to peers. Students with high scores tend not to be concerned about how their behavior appears to other students, not to consult with acquaintances about personal matters, and the like. They might be thought of as unsociable, introverted, or inner-directed. Low scores suggest conformity to prevailing peer norms, sociability, extraversion, or other-directedness.

(L) Liberalism is defined as a political-economic-social value dimension, the nucleus of which is sympathy either for an ideology of change or for an ideology of preservation. Students with high scores (liberals) support welfare statism, organized labor, abolition of capital punishment, and the like. Low scores (conservatism) indicate opposition to welfare legislation, to tampering with the free enterprise system, to persons disagreeing with American political institutions, etc.

(SC) Social Conscience is defined as moral concern about perceived social injustice and what might be called "institutional wrongdoing" (as in government, business, unions). High scorers express concern about poverty, illegitimacy, juvenile crime, materialism, unethical business and labor union practices, graft in government, and the like. Low scores represent reported lack of concern, detachment, or apathy about these matters.

(CS) Cultural Sophistication refers to an authentic sensibility to ideas and art forms, a sensibility that has developed through knowledge and experience. Students with high scores report interest in or pleasure from such things as wide reading, modern art, poetry, classical music, discussions of philosophies of history, and so forth. Low scores indicate a lack of cultivated sensibility in the general area of the humanities.

(MG) Motivation for Grades refers to a relatively strong desire--retrospectively reported--to earn good marks in secondary school. High MG scores represent the respondent's belief that others (e.g., teachers, classmates) regarded him as a hard worker, that the respondent, in his own estimation, studies extensively and efficiently, was capable of perseverance in school assignments, and considered good grades to be personally important. Low scores indicate lack of concern for high marks in secondary school.

(FS) Family Social Status is a measure of the socio-economic status of the respondent's parental family. The scale is comprised of five questions, each having nine scaled alternatives. The five items have to do with: father's occupation, father's education, mother's education, family income, and father's nationality-ethnic background. Father's occupation is given a weight of three. Raw scores may range from 7 through 63.

In CSQ Parts 1 and 2: FI, PI, L, SC, CS

In Part 1 only: MG, FS

In Part 2 only: SF. SA, SM, SS, SH, EI

Except for FS, all scales consist of ten 4-alternative questions. Raw scores range from 10 through 40. No items are included in more than one scale.

Figure 2

Development of the CSQ

Late in 1961, sociologist Martin Trow provided ETS with a pool of questionnaire items which was drawn from a survey he did of a large number of college student research questionnaires. This pool of questions gave the CSQ its essential character.

Four early decisions were made: (1) there would be two partially-overlapping instruments; (2) the questionnaires would be entirely multiple choice and machine scorable; (3) there would be dimensional measurement of a number of variables by means of groups of items (i.e., scales); (4) the questionnaires would be potentially usable throughout the spectrum of higher education, i.e., all questions would be meaningful to students at all types of institutions.

Two 313-item experimental questionnaires were assembled. Some of the items furnished by Trow were included unchanged. Many others, especially the response alternatives, were modified according to one or more of the specifications given above. Additional items or ideas for new items stemmed from a further review of questionnaire research on college students. Finally, a number of items were especially written, particularly where necessary to round out experimental a priori scales.

During the winter of 1963, these experimental versions (Form 313B) were administered to a total of 315 students at four diverse institutions. The purpose was primarily editorial. Student subjects were asked not only to respond to the questionnaire as it was but also to write critical comments in the booklets. Forty-five students at two of the colleges were also interviewed.

Study of this information--response frequencies, written comments, interview remarks--led to a second experimental version (Form 284C). In the late spring of 1963, Part 2 was completed by 6,680 undergraduates at 16 institutions. During the following September, Part 1 was administered to the entering freshman classes at 23 institutions with a total N of approximately 13,000.

Examination of this second round of data led to the present CSQ (Form 200D). Questions which were judged not to have elicited meaningful differences among diverse institutions were deleted. Alternatives with response frequencies that were too small to be of research value were either combined with other alternatives or eliminated. On the basis of internal consistency item analyses, items were discarded so that each scale in the revised instrument would consist of ten questions. Finally, items were eliminated which, from a perspective of some two years experience with the questionnaires, did not appear to be yielding unique and useful information.

The only substantive modification over earlier forms was the addition of a ten-item Motivation for Grades scale in Section II of CSQ Part 1. Most of the items were taken from a brief scale which in research at ETS was seen to have a relatively high correlation with grades and relatively low correlation with measured scholastic aptitude. At the time of this writing, however, no MG scale data have been collected.

The current CSQ, then, is for the most part an abridgment of the previous experimental versions. With a few exceptions item stems and alterantives have not been changed from Form 284C. The available comparative data will continue to be applicable (although in view of the ongoing changes in student and institutional characteristics, these data cannot be expected to serve comparative purposes for an indefinite period of time).

Research Applications

The nine general research questions that are outlined here are illustrative of some of the potential applications of CSQ data. (Actually almost every item in either questionnaire could serve to classify students into categories among which potentially meaningful comparisons could be drawn.) Most of the studies suggested involve little more than straightforward tabulations and can be carried out with an IBM card sorter and collator. Other studies would benefit from statistical analyses and, in particular instances, addition of certain non-CSQ information (e.g., grades, aptitude and/or achievement test scores, the fact of later dropping out, etc.).

In discussing several of the research questions, reference will be made to specific sets of CSQ data that are suggestive of the sort of relationships that might be obtained in many research settings. Except in two instances (pages 37 and 38) these data are from one study of correlates of scores on the 11 scales in CSQ Part 2. The data are based on a subsample of 700 cases that was drawn from an original sample of 6,680 undergraduates at 16 diverse institutions who completed CSQ Part 2 in the spring of 1963. The subsample was stratified according to the USOE enrollment-by-type-of institution figures for 1963.*

1. Description of the freshman class. CSQ Part 1 will provide a great deal of information about the characteristics of entering students. Patterns of recruitment and effects of admissions policies may be assessed. What are the social, demographic and geographic origins of the entering class? What were some of their secondary school activities, accomplishments and perceptions? What are the significant educational and vocational orientations that exist in the entering class? How do patterns of recruitment and admissions correspond to professed aims of the institution?

2. Educational and vocational plans. Knowledge of the educational and vocational aspirations of a student body is likely to be of particular importance to officials responsible for curriculum planning and staffing. In what number are students planning to enter various undergraduate fields? In what numbers do they seek to go on to various graduate and professional schools? What shifts in educational plans occur in students during their undergraduate years? What shifts are observed in successive freshman classes? What factors are associated with these shifts?

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*There were significant sex differences on four scales; women scored lower on the Peer Independence scale ($p < .05$) and higher on the Liberalism ($p < .05$), Social Conscience ($p < .0001$), and Cultural Sophistication ($p < .001$) measures.

3. Characteristics of students in different major fields. What are the social and class origins of students in different majors? How do major fields compare in the degree of heterogeneity of their students? How do different majors compare in holding power? Are there different levels of satisfaction with faculty, administration, and fellow students? Are there differences between students who are in particular fields as a second choice and those for whom the same fields were in the first choice.

The mean score profiles in Figure 3 point to ways in which students (from a range of colleges) classified into three major field groupings differed on the scales in CSQ Part 2.

4. Drop-out and retention. What kinds of students--in the sense of aspirations, attitudes, behaviors--leave at different phases? How are they different from those remaining? Do drop-outs differ in their characteristic attitudes toward and relations with faculty? With the administration? With fellow students? Are drop-out rates higher in certain fields of study? Does the drop-out rate vary with type of student living arrangement? Do drop-outs at particular colleges have distinctive background configurations?

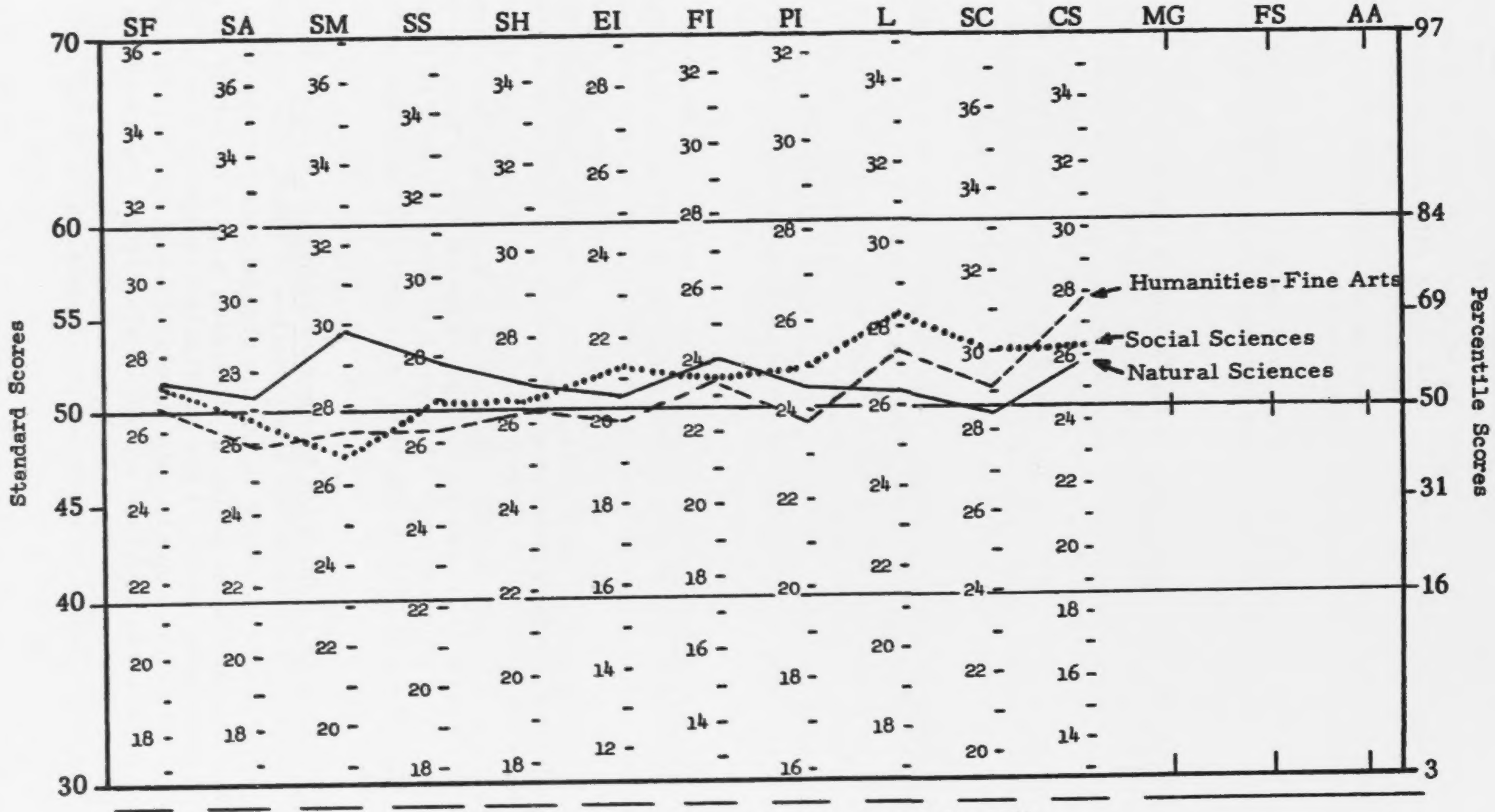
5. Student-faculty relations. Currently there is lively specualtion about the importance of close student-faculty relations. For what kinds of students, or in what subject areas, or at what point in their education is a close relationship with one or more faculty members of greatest consequence? Selected CSQ Part 2 questions may serve to assess both independent and dependent variables, i.e., the "closeness" of the relationship and certain educational effects.

6. Undergraduate discontent. There has also been much recent comment on the extent to which the educational needs of undergraduates are being met, especially at large institutions and where faculty are oriented toward matters other than teaching undergraduates. Questions in CSQ Part 2 bear on satisfaction with faculty, administration, major field and student body. What are the patterns of undergraduate satisfaction and dissatisfaction, for example, from one division to another within a large diversified institution? How are various facets of student morale related to scholastic achievement (Figure 6), major field (Figure 3), class in college (Figure 12), attrition, political beliefs, and so forth? The data on page 31 appear to lend support to the widely current contention that student dissatisfaction is associated with institutional size (enrollment).

7. Tabulations of interest to special campus groups. Numerous studies of various subgroups of students are possible. What, for example, is the pattern of religious preference in the freshman class or in the total student body? How many and what kinds of students, e.g., in terms of social background and educational goals, have particular religious ties? How many and what kinds of freshman hope to join fraternities (CSQ Part 1)? How many actually are members, and how do they differ from independents (CSQ Part 2)? The differences between independents and fraternity-sorority members shown in Figure 5 are not likely to surprise most observers of the college scene.

COLLEGE STUDENT QUESTIONNAIRES; PARTS 1 & 2

Profile of Group Means

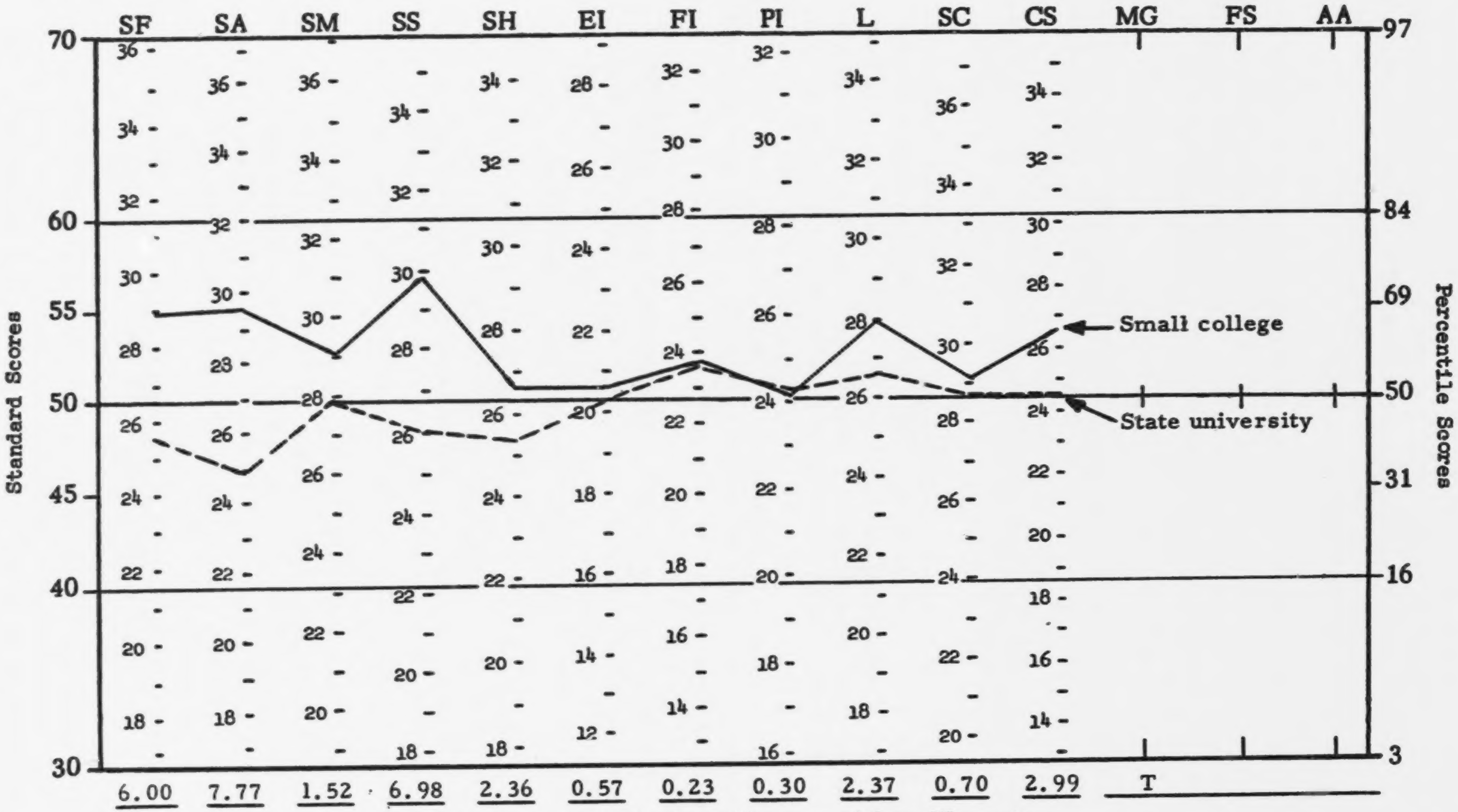


Students majoring in: humanities-fine arts (N=106), natural sciences (N=105) and social sciences (N=84)

Figure 3

COLLEGE STUDENT QUESTIONNAIRES; PARTS 1 & 2

Profile of Group Means



Small college students; attending one of four lib. arts colleges with enrollments of approx. 1000. (N=101)

State university students; attending two medium-sized eastern state universities. (N=217)

Figure 4

What are the honor students like, other than that they earn high grades? The profiles in Figure 6 point rather clearly to certain attitudinal differences between scholastic achievers and non-achievers. There is an interesting chicken-and-egg problem, does grade-getting capacity lead to satisfaction (high SF and SM scores), or is it the reverse?

Similar studies could be made of foreign students, or of students of particular racial or ethnic background, or of students admitted on probation. Information like this about various student subgroups could be of considerable practical value to officials and organizations in the general area of student services.

8. Studies based on the Clark-Trow typology. Sociologists Burton Clark and Martin Trow have proposed an analytical model consisting of four student subcultures--the vocational, the academic, the collegiate and the nonconformist. A procedure for classifying respondents according to this typology is contained in both questionnaires.

An institution might be interested in the relative frequency of the four types in the overall student body and/or in various subdivisions. Are there shifts in the type-distribution for a given class over the college years? Persons who have commented on our published freshman data (mainly editorial writers) have observed that senior proportions are likely to be quite different from freshman proportions, i.e., that the dropout rate would be higher for the non-intellectual collegiate type than for the other types. Our impression, based on unpublished Part 2 data (cross-sectional), is that differences between freshman and senior type-distributions generally are very small. In both the larger sample (N=6,680) and the subsample of 700, there were slightly larger proportions of both academics and collegiates among the seniors (and a corresponding reduction in the proportion of vocationalists). However, there is certainly reason to believe that shifts over time in terms of the Clark-Trow model would differ considerably from one college to another.

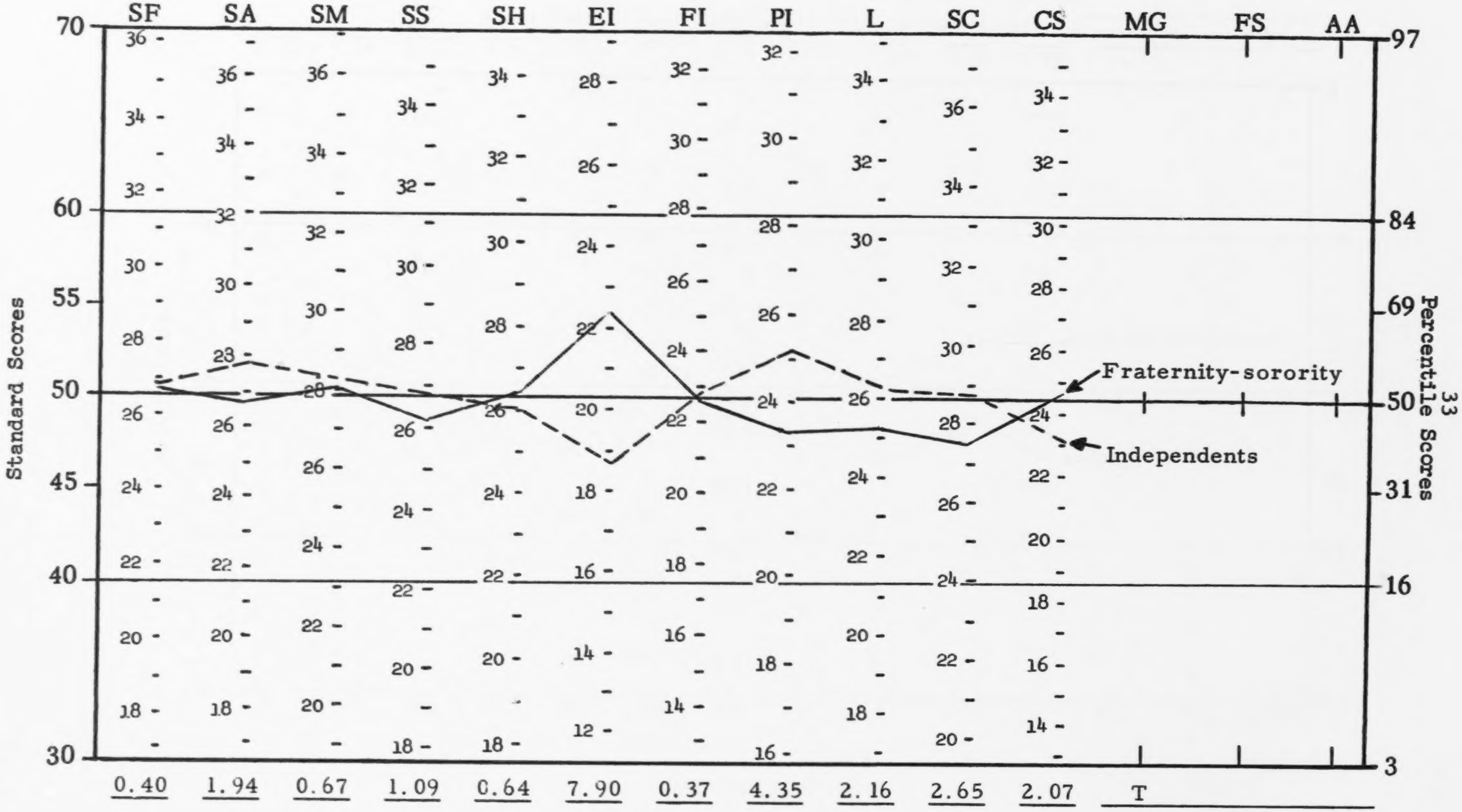
The material in the following pages deals with our method for operationalizing the Clark-Trow paradigm. Mean scale scores for the four types, based on the multi-college sample of 700 students, are profiled in Figure 7. F-ratios for the differences among the four types were significant ($p < .001$) for ten of the 11 Part 2 scales; the Satisfaction with Major scale was the exception.

The first two illustrative type-distributions (Figures 8 and 9) are for selected subgroups from the sample of 700 undergraduates. The second pair of diagrams (Figures 10 and 11), which depict entire entering freshman classes, are from Part 1 data collected in the fall of 1963. (The length of a side of any square is the square root of the corresponding proportion.)

9. Student change and the criterion question. Roughly half of the items in CSQ Part 1 are also included in CSQ Part 2. Changes in educational and vocational plans and in certain attitudes may be assessed between the time students are entering freshmen and the time they are graduating seniors. Using Part 2, year to year shifts in various activities and perceptions of students as students at a particular college may be identified. Particular subgroups could be studied. For example, do students admitted on a provisional

COLLEGE STUDENT QUESTIONNAIRES; PARTS 1 & 2

Profile of Group Means



Fraternity-sorority members (N=122)

Independents (N=249); students on campuses that have social fraternities and sororities, but who indicated no interest in joining one

Figure 5

COLLEGE STUDENT QUESTIONNAIRES; PARTS 1 & 2

Profile of Group Means

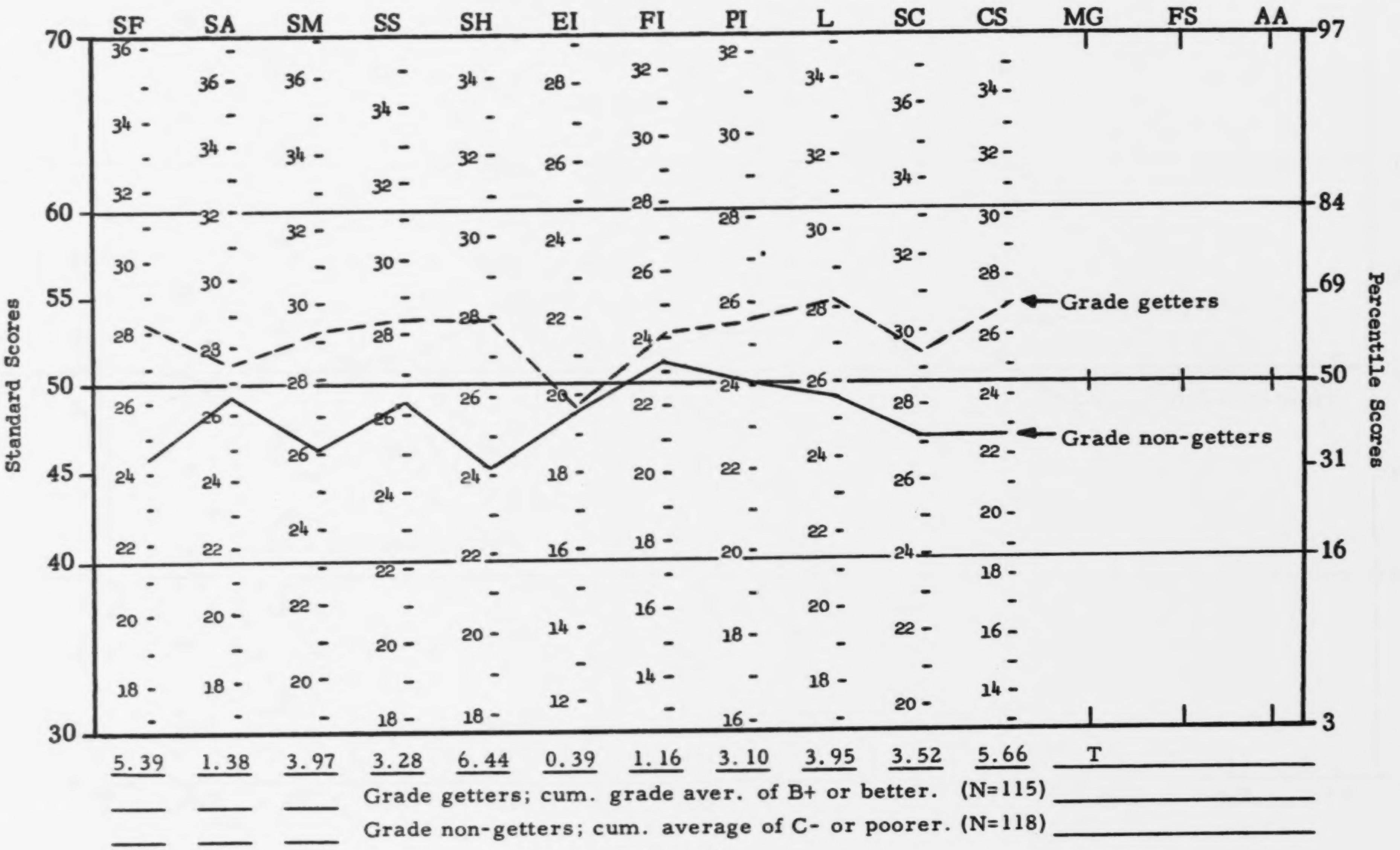


Figure 6

basis prove to be "late bloomers" (as evidenced by grades and/or achievement test scores)? Are different patterns of change associated with type of living arrangement or organizational affiliation? Is differential change associated with major field of study, with satisfaction with college, with scholastic achievement? Can various patterns of student change be linked to background circumstances as identified by CSQ Part 1 responses?

The results given in Figure 12 represent a cross-sectional comparison of freshmen and seniors attending the same group of institutions. Differences are generally small. Seniors were somewhat more critical of the administration and, somewhat curiously, their fellow students. While the Liberalism and Cultural Sophistication differences are statistically significant, they of course cannot be attributed solely to institutional influences. Indeed, since L and CS scores are related to academic achievement (Figure 6), the freshman-senior differences on these two variables could be largely due to academic dismissals. The apparent fact of no difference on the Social Conscience scale is of more than passing interest.

The criterion question, needless to say, is an enormously difficult one. Definitions of "growth" or "success" or "desired impact" are capable of infinite subtlety. Available measurement techniques are seldom sufficiently sensitive. These limitations notwithstanding, the general problem--whether what _is_ happening to students during their stay at college is what _should_ be happening--is perhaps _the_ crucial question for contemporary American higher education; and it cries out to be understood. The CSQ, a rather simple multiple choice questionnaire, is far from a panacea; it is offered merely as an additional tool for studying the problem at those institutions where the definition of the criterion includes not only academic dimensions such as grades and achievement test gains, but also nonacademic dimensions such as satisfaction with one's college experience, independence of thought and action, social concern, new aspirations, and the like.

Local Options in Using the CSQ

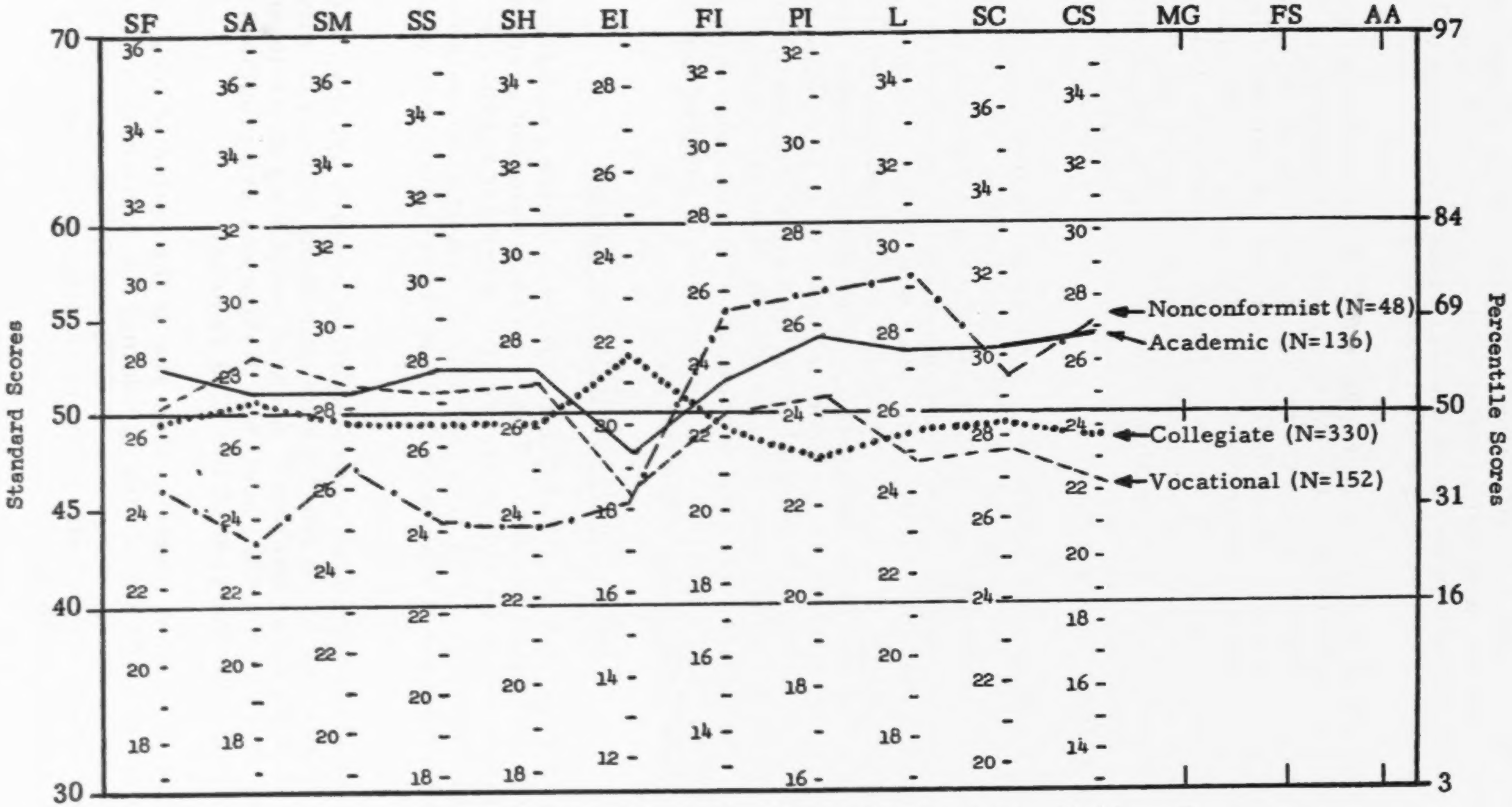
The CSQ is regarded as a flexible instrument which can be readily adapted to local interests and requirements. For example, selected sections from either questionnaire could be administered if it were not feasible to employ the instrument in its entirety. It is also possible to require students to omit any of the individual questions if advisable in view of circumstances of time and place.

The answer sheets for both questionnaires contain spaces (lettered A through J) for answering up to ten 9-option questions written locally to obtain information of strictly local interest. A sheet containing these items would be inserted into the front of the CSQ booklet. Responses are tabulated at ETS and reported back along with the rest of the CSQ results.

All matters of student identification are at the option of local officials. The answer sheets provide for coding (gridding) the information needed for matching CSQ answer sheets with various ETS and CEEB tests (SAT, GRE, Comprehensive College Tests, etc.) There is also space for coding a locally assigned identification number.

COLLEGE STUDENT QUESTIONNAIRES; PARTS 1 & 2

Profile of Group Means

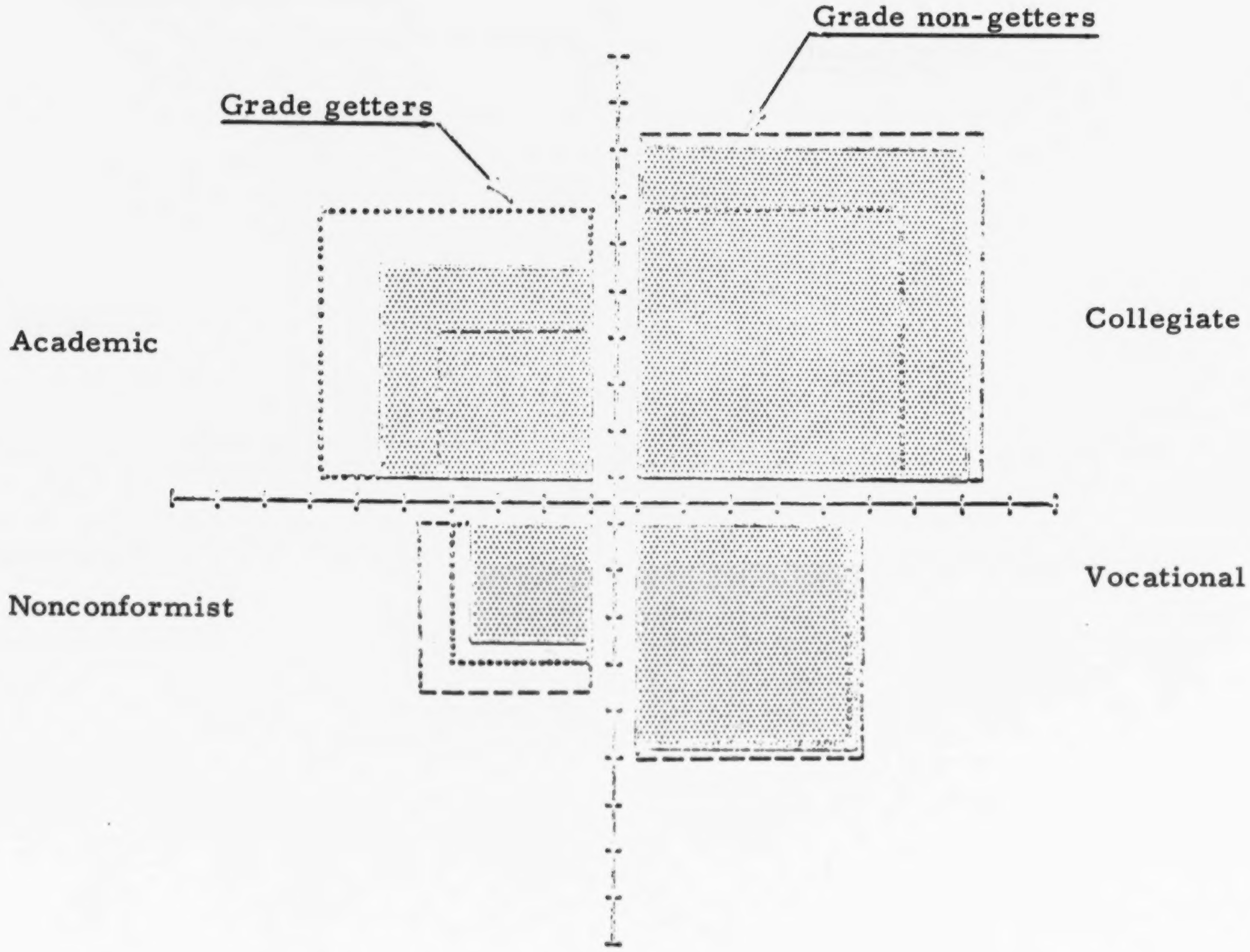


6.28 13.50 2.22 8.40 10.08 27.63 6.62 24.74 18.55 8.21 24.65 F

Sample classified according to a typology of college student subcultures proposed by Burton Clark and Martin Trow.

Figure 7

CSQ-2
Individual "norms" shaded


Grade non-getters
Grade getters
Academic
Collegiate
Nonconformist
Vocational

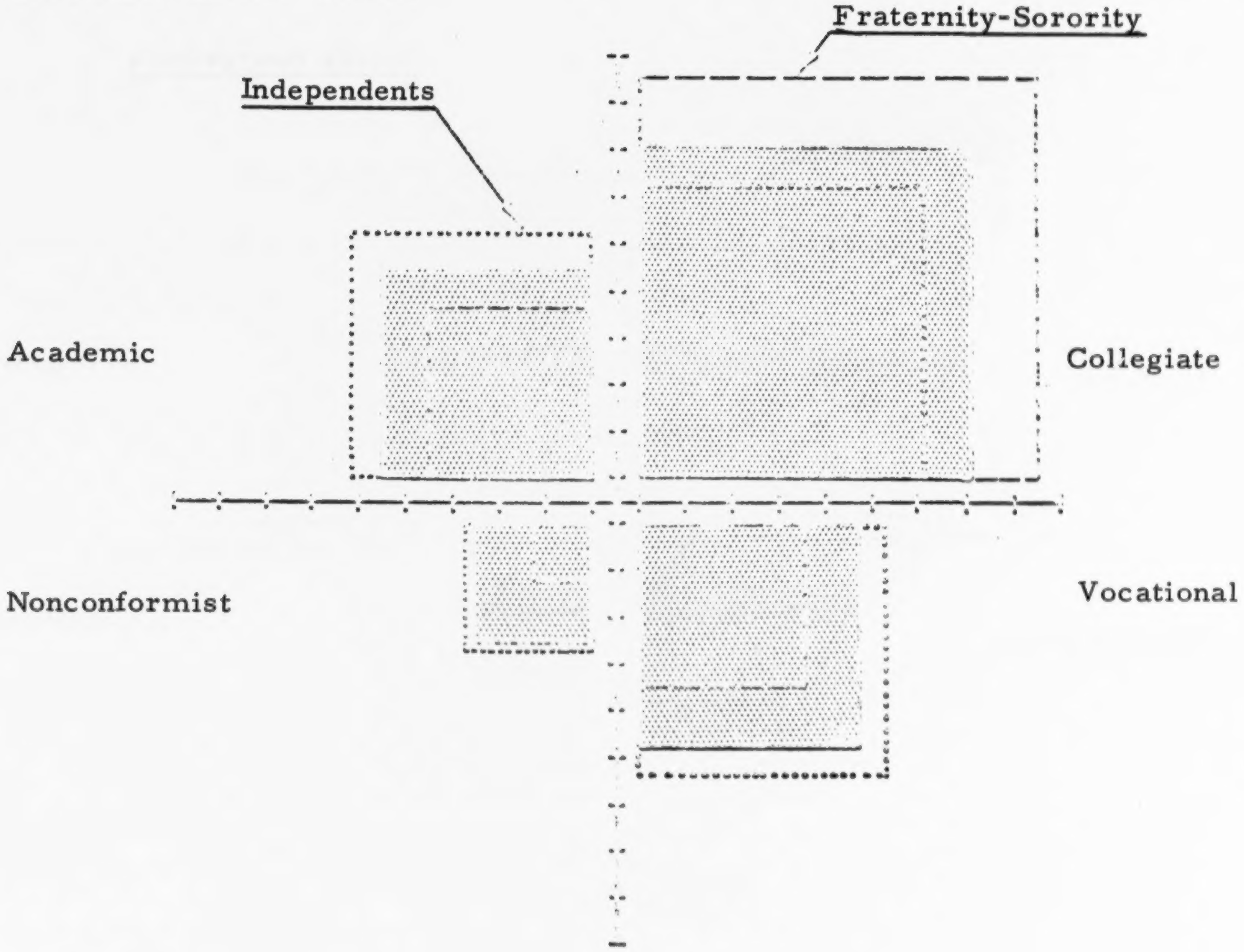
Type	Indiv. "Norms" N	Indiv. "Norms" %	Grade getters N	Grade getters %	Grade non-getters N	Grade non-getters %	
Vocational	152	23	25	23	26	24	
Academic	136	20	38	34	11	10	
Collegiate	330	50	38	34	60	55	
Nonconformist	48	7	10	9	13	12	

Grade getters; cum. grade aver. of B+ or better. (N=111)

Grade non-getters; cum. average of C- or poorer. (N=110)

Figure 8

CSQ-2
Individual "norms" shaded


Fraternity-Sorority
Independents
Academic
Collegiate
Nonconformist
Vocational

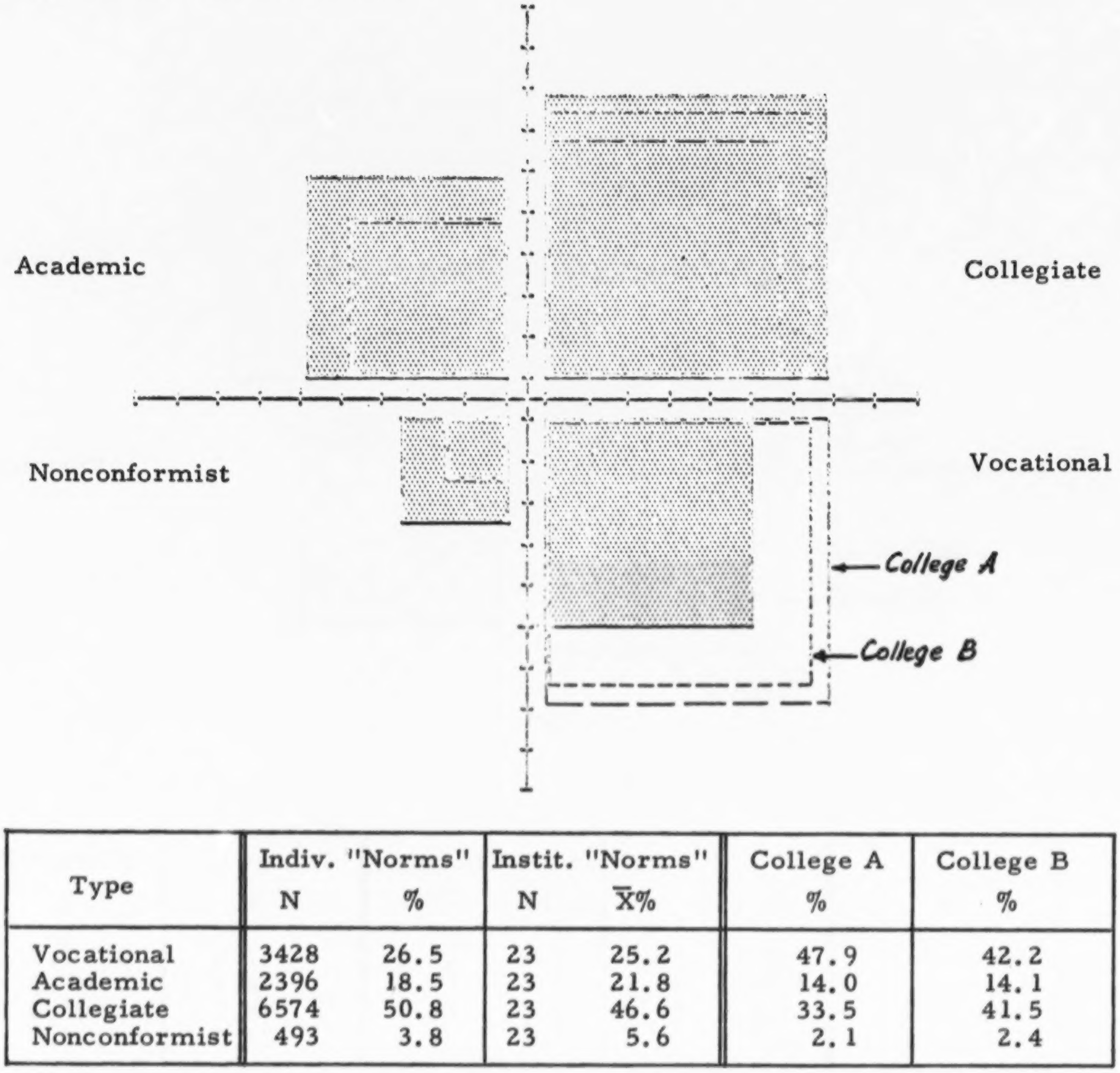
Type	Indiv. "Norms" N	Indiv. "Norms" %	Independents N	Independents %	Fraternity Sorority N	Fraternity Sorority %	
Vocational	152	23	69	28	16	13	
Academic	136	20	64	26	16	13	
Collegiate	330	50	96	39	87	71	
Nonconformist	48	7	20	8	3	2	

Independents (N=249)

Fraternity-sorority members (N=122)

Figure 9

CSQ-1
Institutional "norms" shaded



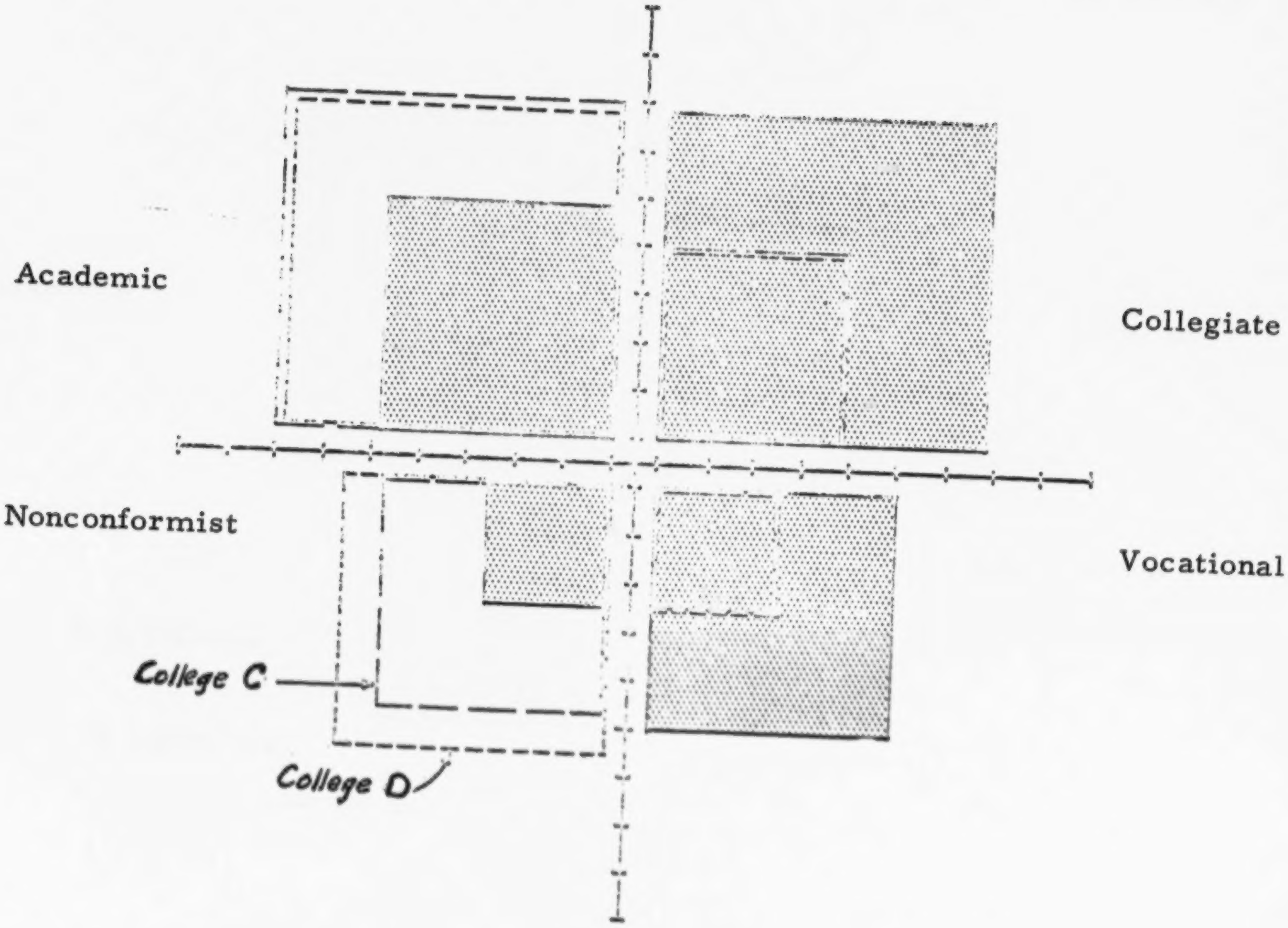
Type	Indiv. "Norms" N	Indiv. "Norms" %	Instit. "Norms" N	Instit. "Norms" $\overline{X}$%	College A %	College B %
Vocational	3428	26.5	23	25.2	47.9	42.2
Academic	2396	18.5	23	21.8	14.0	14.1
Collegiate	6574	50.8	23	46.6	33.5	41.5
Nonconformist	493	3.8	23	5.6	2.1	2.4

College A: Private technical instituion. Freshmen: all men; mostly working class backgrounds; engineering (70%), technical speciality (10%), physical sciences. Top half of high school class.

College B: Private technical institution. Freshmen: all men; mostly middle class; engineering (65%), business administration (14%), physical sciences. Moderately selective.

Figure 10

CSQ-1
Institutional "norms" shaded



Type	Indiv. "Norms"		Instit. "Norms"		College C	College D
	N	%	N	$\overline{X}$%	%	%
Vocational	3428	26.5	23	25.2	7.0	7.3
Academic	2396	18.5	23	21.8	48.9	47.3
Collegiate	6574	50.8	23	46.6	14.7	14.5
Nonconformist	493	3.8	23	5.6	23.3	30.9

College C: Independent liberal arts college. Freshmen: all women; upper middleclass (mainly professional); mathematics and sciences (3%), social sciences (23%), humanities and fine arts (44%). Selection ratio: about .25.

College D: Independent liberal arts college. Freshmen: all women; upper middle-class (mainly professional); mathemathics and sciences (11%), social sciences (25%), humanities and fine arts (47%). Selection ratio: about .40.

Figure 11

COLLEGE STUDENT QUESTIONNAIRES; PARTS 1 & 2

Profile of Group Means

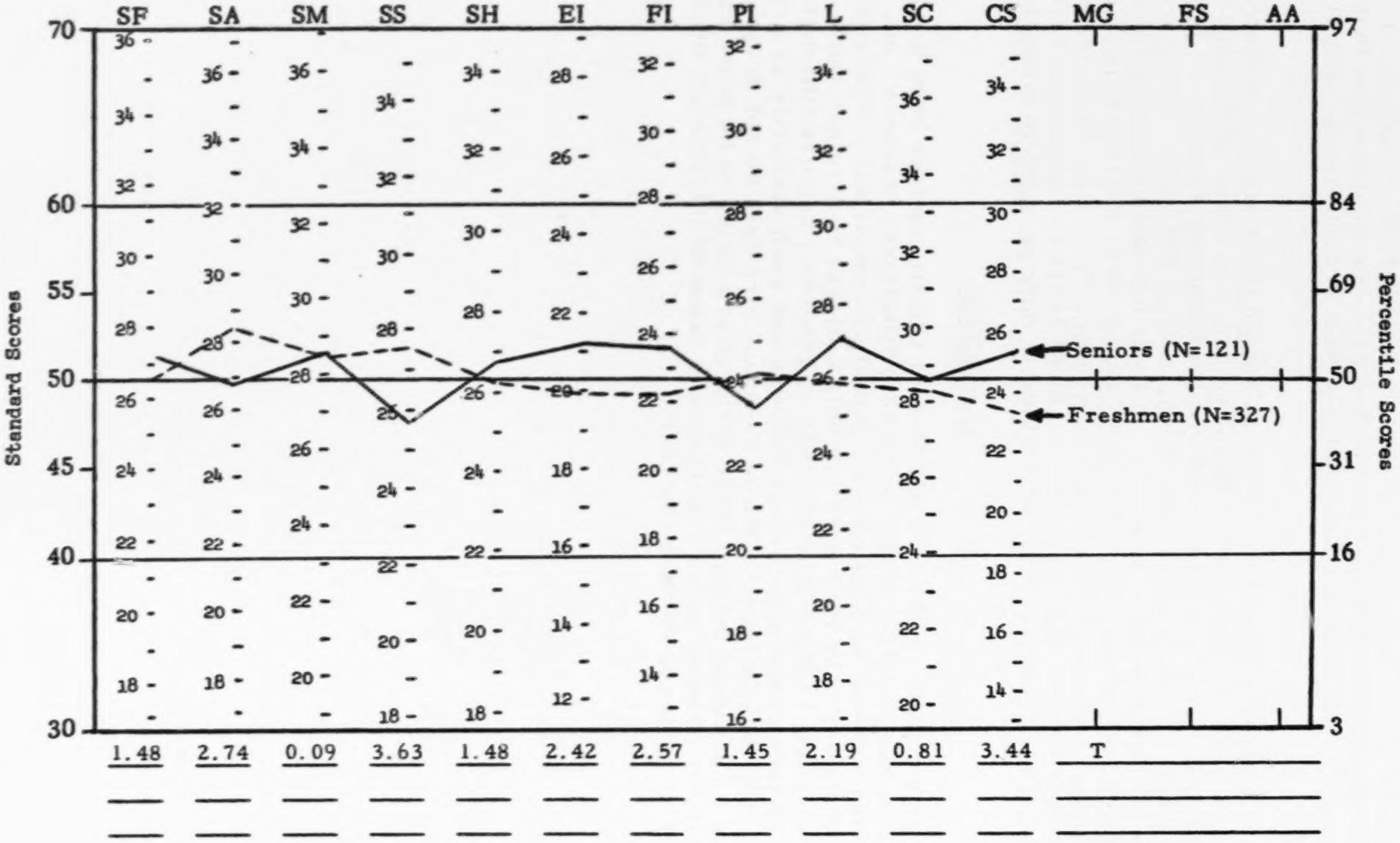


Figure 12

Generally the necessity for student names depends on the intended uses of the CSQ data. Names would not be needed if, for example, the purpose was simply to describe the freshman class. In most designs that entail following-up students as, for example, in a dropout study, names would be required.

Some researchers may wish to design their studies to include a measure of of academic aptitude as a control variable or as an additional descriptive dimension. Since at a good number of institutions scholastic aptitude test scores are not conveniently available, a brief (30 item, 12 minute) semi-secure SAT-type test of academic aptitude has been developed for optional use with either questionnaire. Entitled Control Test AA (academic aptitude), the instrument contains both verbal and quantitative items; it yields a single total score only (rather than separate V and M scores). Because of its brevity (split-half reliability, .79), it is suitable only as a group measure of aptitude.

Conclusion

In conclusion, the College Student Questionnaires have been developed to serve as a flexible, multi-purpose institutional research tool. In resourceful hands working in a climate not hostile to empirical social research, the questionnaires may very possibly help colleges to a rather more systematic understanding of their students than is generally acquired through the impressions of faculty and admissions officers and such statistics as are maintained in the Registrar's office. While questionnaire data do not in and of themselves dictate educational policy, these policies are likely to be more effective when in their formulation some cognizance is taken of information of the sort obtainable from instruments like the CSQ.

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In recent years curriculum study has assumed increasing importance. The squeeze placed on universities because of more students, proportionately less money for operating, and fewer qualified personnel has made better utilization of present resources imperative. Yet the curriculum has been described by the Commission on Financing Higher Education as the greatest extravagance in almost every type of institution.

More than dollars and cents are at stake, however. These post-Sputnik years have caused changes in the secondary school curriculum, producing a new generation of students better prepared than any past group of high school graduates. And how well prepared are colleges to meet this new generation? In some areas, such as the sciences and mathematics, the college curricular evolution is evident; in others it lags. But change or lack of change must always be made with an eye toward improving the outcome. Consequently, a continuing evaluation of curriculum is imperative. Even before a revision is made, the wheels should be set in motion to collect evaluative data.

Historically, curriculum studies have not always led to progress: for example, the Yale Report of 1828. By recommending the status quo in curriculum, this report unfortunately succeeded in delaying changes in the classical college curriculum for several decades.

Though curriculum is the chief instrument by which an institution carries out its purposes, it is extremely difficult to see as a whole or to examine for quality, efficiency, or propriety. What's more, it is often protected by tradition and the loyalties of narrow specialists.

These comments are directed at identifying problem areas of the curriculum and suggesting methods of study. The types of problems are probably common to most institutions; the methods are some of those that have been used or are being used at Michigan State University.

Identifying Course Proliferation and Dead Wood

With the impetus given to the elective system at the turn of this century, and with the more recent explosion of knowledge, courses have been added to the college curriculum at an overwhelming pace. The tendency always seems to be to expand, add more courses, more programs, more departments, rather than to re-vitalize, reconsider objectives, and cut out dead wood. American universities are not unlike the American in the elephant story. A Frenchman, a Pole, and an American were all confronted with the sight of their first elephant. Each responded in a typical manner. the Frenchman said: "I will write about the sex life of the elephant." The Pole said: "My discourse will be on the elephant and the Polish question." And the American said: "I will write about bigger and better elephants."

No one disputes the need for better curricula, but sheer quantity of courses does not achieve it. The catalog offerings of a university are breathtaking when examined from the point of view of opportunities for students, but upon closer examination these offerings may be unbelievably outmoded and overlapping.

There are three different methods by which to study this premise.

1. A comprehensive analysis of catalog course descriptions.
2. A comparison of textbooks required for each course.
3. A comparison, for each of the past several years, of courses _listed_ with those actually _taught_.

Each of these methods proved effective. The catalog study identified several types of proliferation. There were found, for example, courses adapted to special groups that had only a slight variation in topics included; eight courses were taught on family life by the departments of Sociology, Psychology, Social Work, and Home Management.

The textbook study simply compared lists of required textbooks for each course in order to get beyond catalog descriptions. It was found that the same textbook was sometimes required in four or five courses in the same department, or in other instances for courses in different departments, and in courses ranging over the freshman to the graduate level. This study does not necessarily provide conclusive proof of course duplication, but it does suggest where a second look is needed.

The third method, a comparison of courses listed with those taught, showed that some courses had not been taught in five and sometimes ten years. This has recently resulted in a university ruling that drops any course not taught in four years. Perhaps this is a good place to mention how helpful it can be to maintain trend or historical data on the curriculum. In fact, the research office has begun a curriculum book in which it annually adds for each department such data as average section size, credit-contract hour ratios, number of courses at each credit value, and the like. This kind of information will naturally vary according to institutional needs and purposes, but the point is that trend data succinctly presents the kind of long range directional view helpful in the study of an institution's curriculum.

Identifying Student Program Patterns

Although each college catalog lists course requirements that a student must meet to graduate, what each student actually takes can vary greatly, at least from what is recommended. The reasons for this are:

1. Most programs offer alternatives or electives for the student.
2. Programs and requirements are adjusted for the student who has transferred from another institution or who has changed his major.

A number of significant questions can therefore be asked about the graduating senior's program of courses:

1. Do electives give breadth to the student's program or merely allow more specialization?

2. What proportion of lower level and upper level courses are taken by students?

3. What is the nature of the student's major? What proportion of the total hours does it consume? What use does it make of related areas?

A method used at Michigan State University to examine these questions is the analysis of transcripts of graduating seniors. The focus of this approach is the department,as represented by a random sample of its graduates. Although the analysis takes a good deal of time, the results provide information not otherwise available.

The questions formulated for this transcript study were based on a set of educational principles, some of which were:

1. A prescribed portion of undergraduate degree credit shall be at the junior and senior levels combined.

2. At least 50 per cent of all undergraduate curricula shall be in courses in the basic arts, social sciences, and natural sciences.

3. Breadth and flexibility rather than narrow specialization need to be emphasized on the undergraduate level.

By also using principles as guides or standards for comparison one can interpret more meaningfully the results of a study of this nature.

Curriculum Study that Aids Course Planning and Review

Supposing one were chairman of a department of English involved with instructional assignments and budget needs for the coming year, and he heard via the academic grapevine that because of a change in teacher certification requirements, the elementary education department will be doubling the number of English courses required of its majors. Obviously this will have some effect on department needs, but to what extent? How many more instructors are needed? Should some courses be planned differently?

Particularly helpful at this time would be information about the present number of elementary education majors enrolled in English courses. On this basis, projections could be made for the following year with some degree of confidence.

The kind of information that should be made available to each department then is the number of students from each curricular area enrolled in the courses of that department. Department chairmen and curriculum planning committees would thereby know the percentage of students from their own department in their courses as well as the percentage from each other curricular group.

Going a step further, one could categorize each course in the curriculum by using source of enrollment and course prerequisites as criteria.

Categories such as the following four could be determined for curriculum review purposes:

1. Courses whose primary justification is that they are required for students majoring in other departments or curricula. These are often called "service courses," and they are not ordinarily taken by majors. (For example, calculus for physics majors.) Courses in this category should be reviewed to determine whether students therein might be better served by a course in which the essential characteristics are not modified or sacrificed to specialized interests.

2. Courses which are primarily general or liberal education offerings and given without prerequisites as electives for majors in other disciplines. These courses might be designated in some fashion which will assist students and their advisers in identifying them. Most student advisers know little or nothing about courses outside their own area.

3. Courses for majors in the department: either those required of all majors or as electives for departmental majors. A review of courses in this category would identify to what extent a sequence with order and prerequisites is clearly indicated; and to what extent an overly specialized undergraduate education is encouraged.

4. Courses which are highly specialized resulting from the interests of a particular staff member and serving the interests of relatively few students. On the undergraduate level the appropriateness of a great many of these courses, as well as the economy of them, is questionable.

These categories are not distinctive, and some courses will fit into more than one. But classification in this way makes possible an easier and more systematic review of the total curriculum. We have, in fact, put together an up-dated IBM card deck of each course in the curriculum. This allows us to pull together courses according to any of several classifications, depending on the purpose of the particular review. (For example, interdepartmental courses, independent study courses, etc.) Also, since our university catalog, like many, is not published annually, we have available the most current information on the curriculum.

Evaluating Curricular Effects on Students

The last area of curriculum study is perhaps the most intriguing and difficult one: the evaluation of a curriculum (or course) by collecting data on student achievement, attitudes and impressions. Although evaluating a course in this manner is feasible, a comprehensive and valid evaluation of a total curriculum is seldom accomplished. The problems inherent are many. There is, first, the difficulty of attributing results to only the planned curriculum. Interaction with unplanned or uncontrolled factors should be expected. A number of studies have suggested that peer groups, as well as the total college environment, may have a more potent effect on students than the structured curriculum. Second, the array of courses, instructors or students in a curriculum seldom remains constant for any period of time. Achievement gains might be attributed to any or all of these factors.

These same problems, although still present, are less formidable when a single course is evaluated. For example, a few years ago, a member of the staff evaluated a revised communication skills course by first sampling several sections taught by different instructors. Achievement tests were administered to students at the beginning and end of the year. Comparisons of gains were made with scores from the previous year before the course was revised. Aptitude differences that might have existed between the two groups could of course be statistically controlled. Hence, it was fairly safe to conclude that the relatively larger gains found after the course was revised were due to course improvement.

In this study, it was essential that comparable evaluation data from the prior course be available. Many attempts at course or curriculum evaluation are thwarted by the lack of such data. Furthermore, both courses being compared must have like objectives; otherwise there is no reason to believe the outcomes can be compared.

In spite of the difficulties in total curriculum evaluation, there are some important questions that can only be answered by research attempting to measure a total effect. One such question involves the use of larger credit blocks in the college curriculum. Some colleges already operate in this way. Instead of the usual two or three credit package that results in a student carrying five, six or even seven courses per term, larger credit blocks are designed. Students therefore enroll in three or four courses, often extending over an entire year and sequentially related to courses of the following years. The assumption underlying these larger blocks of learning is that it permits better and more intensive learning and instruction by reducing the number of courses carried by students and taught by instructors. It is also assumed that students can take on more responsibility for their own learning; hence, the scheduled class contacts are usually less than credit granted for the course.

Here then is a highly significant and hopeful area of total curriculum study. If larger credit blocks can be shown to result in better learning, or even an equal amount of learning, further benefits such as fewer courses in the total curriculum, fewer course preparations for instructors, and simplified student registration would also be derived.

Summary and Conclusions

Problems and possible techniques of curriculum study have been discussed. Possibly the majority of problems chosen are mainly indigenous to larger institutions, but most institutions are growing and may soon face them. Certainly many more problem areas exist and require study, such as curricular opportunities for the gifted student, or the effective inclusion in the curriculum of television, teaching machines, and computer based instruction.

The examples discussed also point out the fact that the study of curriculum cannot be separated from other phases of instituional research. Studying an institution's curricular offerings is bound to include and have some effect on not only quality of instruction and quality of graduates, but on cost, section size, instructional staff needs and space needs.

JAMES W. COLMEY
GEORGE PEABODY COLLEGE FOR TEACHERS

The following presentation is based on the assumption that research potential is increased when basic rather than derived units of information are collected. Data processing equipment has made it feasible and improved technical knowledge and equipment will make it practical to manipulate, store, and retrieve almost infinite amounts and kinds of data. Before basic data systems will supersede derived data systems, however, much experimentation will be needed.

The following techniques for requesting basic data may be used:

1. Data questionnaires
2. Data lists
3. Punch cards
4. Mark sense cards

The data questionnaire can be designed for optical or recognition scanning. Either type or mark-reading sheets can be used. The optical scanning approach provides a means of obtaining original records in machine usable form. Clarity in design, responsible reconciliation, and thorough editing are required.

During 1964 and 1965, this author has had an opportunity to work with United States Office of Education personnel in conducting two field tests related to the general area of collecting basic data from institutions of higher education. This work was initiated by the Division of Educational Statistics and has been continued by the National Center for Educational Statistics that was established February 1, 1965.

It would be wise for all institutional research personnel to learn more about this new center. The cooperation of institutional research personnel will be needed, and all institutional research should benefit by this expanded national statistics program. Dr. Charles T. Roberts, Director, Field Programs Branch, can help acquaint interested persons with this center.

The first field test in this series was conducted by the Tennessee College Association Center for Higher Education with the assistance of the Office of Education. This Tennessee State Field Test was designed to test forms and procedures of a request for fourteen items of basic data for professional personnel and eight items of basic data for classes for all Tennessee institutions of higher education. The items selected for this test were as follows:

Description of Individual Professional Personnel Data Collected:

Social security or employee number
Sex
Marital status
Last two digits of year of birth
Academic rank
Year of current employment
Contract period

Contract salary
Summer employment
Summer salary
Principal assignment
Teaching field
Highest earned degree
Was highest degree earned in Tennessee (yes-no)

Description of Individual Class Data Collected for Professional Personnel:

Social security or employee number
Department
Course number
Abbreviated title of course
Section
Course level
Credit value
Class size

The field test was designed to take place in eight months (from May 1, 1964 to December 31, 1964). During this eight-month period, requests had to be mailed, information received, statistical presentation designed, the data processed, and the results published for actual use.

Forty -four of the forty-eight colleges and universities in the state were members of the Tennessee College Association Center for Higher Education located at George Peabody College for Teachers in Nashville, Tennessee. This center had been established to affect voluntary coordination in state planning and the voluntary exchange of information among institutions of higher education in the state. Tables derived from data collected for this field test were published as a section of a 1964 comprehensive survey of Tennessee Higher Education.[1] Therefore, more cooperation was expected and received than ordinarily could have been anticipated.

Included in the several pages of recommendations resulting from this state field test report was the following:

> Field tests of optical scanning (mark-sensing) and recognition scanning (type-sensing) should be conducted or encouraged to reduce the expense and time required to transform data into machine usable form.[2]

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[1] James W. Colmey, "Tennessee Higher Education, A Report to the Commissioner of Education, Tennessee State Department of Education, December 31, 1964" (Nashville, Tennessee: Center for Higher Education, George Peabody College for Teachers) (Mimeographed, 152 pp.).

[2] James W. Colmey, "Tennessee State Field Test for the Collection and Utilization of Higher Education Professional Personnel and Class Data" (Nashville, Tennessee, February 28, 1965) (Mimeographed, 79 pp.).

In consideration of the above conclusion, a second field test (to be referred to as the Registration Field Test) was arranged to be conducted by the Office of Education under this author's consultative guidance. This test was conducted with three Tennessee institutions of higher education using optical scanning documents during their regular registration procedure.

One document was designed for faculty personnel to complete, and a second was designed for students to complete. A separate page of instructions was included and used for both faculty and students. Each document, on the front and back of an 8 1/2 x 11 sheet of paper, used personnel and class data requests similar to those in the Tennessee State Field Test mentioned above.

The Registration Field Test was conducted in three different settings described below:

1. Documents were issued and completed during an assembly hour at a small private college with approximately 450 students and 21 faculty members.

2. The student document was included in registration packs and completed in early and regular registration periods at a state college with 4,500 students. Approximately 2,000 students completed the forms during the first two-day registration period and approximately 2,500 more students completed the document during the second two-day registration period.

   At this institution, the forms were delivered through campus mail to faculty members three weeks after registration. These faculty members took several weeks to return the document, but nearly all of the 200 faculty members did return them completed.

3. A large state university with nearly 11,000 students used the student and faculty forms during a single registration week. Over 10,000 students and approximately 400 faculty members returned the forms with their other registration information requests. Faculty members were given the faculty document at a dean's meeting.

Though some explanation was given to the faculty as to the purpose of this field test, the students merely received their instruction sheet and document scanning form to fill out during the registration period. Students had some questions about the test, but had no difficulty in completing the form in approximately 15 to 20 minutes. Nearly all of the students treated the form in a routine manner. Faculty response was generally reported to be positive or complacent. Though some faculty members objected mildly, they apparently all completed the form without any particular follow-up attention or pressure. Administrative officials in these institutions had been instructed that if serious difficulties were encountered during the field test to drop the field test and report the difficulties. No serious difficulties occurred.

Through observation and editing, these two document scanning designs were being field tested to determine positive or negative results for the following:

1. Student and faculty reaction
2. Student and faculty compliance
3. Design effectiveness as a data collection instrument

On-the-spot observations made it clear that student and faculty reaction was either positive or complacent. *It can be concluded that students and faculty members will accept a well-designed scanning document as a responsible and reasonable way to report necessary information.*

Machine and manual testing of design effectiveness are taking place at the time that this paper is being presented; therefore, it is not yet possible to report the extent of the accuracy and the frequency responses to individual questions. However, a few observed weaknesses can be reported at this time:

1. Field check points reported numerous omissions where response items were crowded, poorly located, or where an extremely fine print was used.

2. Marking appeared to be generally adequate, but a number of initial rejections are resulting from improper or weak marking.

3. Questions must be unequivocally clear. Several were not.

4. In spite of clear instructions, improper uses of documents were observed: namely folding of forms, using non-carbon ink, stapling, etc.

5. The alphabetic design used in the tested documents (without a continuous sequence of letters) is not adequate.

6. The use of both sides of the paper created a problem since the manufacturer of the equipment used in this field test did not have equipment that simultaneously read both sides of the paper. The editing and recording process was slow. Also, it was necessary to manually mark-sense the control number on the back side of the document scanning form, since printing equipment was not available at the time of this test to allow for a control number to be preprinted in machine usable form on both sides of the paper.

General Conclusion

Institutional records should include basic data related to staff, students, programs, facilities, and finance. To analyze or manipulate basic units of information, some original records should be obtained in machine usable form. This procedure should ultimately improve accuracy and reduce processing time. Institutional operating expense, however, may be expected to increase with initial designing, editing, and programming responsibilities. Without expending the time and money necessary to provide the clarity in design, the responsible reconciliation, and thorough editing required of this procedure, it will be irresponsible and more expensive to initiate the collection of original records in machine usable form.

JOSEPH N. FROOMKIN
DP DIVISION - IBM

Whenever I am asked to talk about computers and simulation, I am reminded of a story about Justice Oliver Wendell Holmes. Justice Holmes was once traveling on a train, when the conductor asked him for his ticket. The aged Justice frantically looked through all his pockets but could not find it. The conductor recognized him and said, "Mr. Holmes, don't worry, I am sure the railroad will trust you to find the ticket and mail it back to us." At which point Mr. Holmes gruffly replied, "Young man, that's not the problem at all. The problem is to find out where I'm going."

Very often I am asked, "Say, what's the ticket on computers in this or that field?," and I very seriously ask my questioner, "Where do you think you are going?"

Computers are an exceptionally useful tool to an overworked, busy man with imagination. Since this description fits many of you, I am sure that you are already heavy users of computers. In many instances, the computer is the inquiring manager's most often used crutch. It can provide information at very low cost. Existing stock of punch-card or "taped" information can be processed repeatedly to gain new insights into management aspects of an organization. My colleague, Dr. Hunter, recently told me of the pay-off from matching published classroom assignments with janitorial schedules for a major New York school. Since certain classrooms were only used three times a week, it was sufficient to dust and clean them the night before they were used, instead of every school day. This produced a considerable saving in janitorial expense which I hope against hope will be channeled to increase teacher salaries.

Similarly mundane applications of computers can give you a number of other insights which are difficult to gain on an intuitive basis. For example institutions with separate residence halls, each with its own kitchen, may institute quality control procedures by measuring such simple ratios as the number of students eating in the hall and the number of meals that were paid for. Another way of estimating the quality of meals is to measure quantity of garbage removed per meal prepared or meal eaten. I would not mention this topic if I did not know of at least one insitution which considerably improved its food management by making such simple studies. At the same time, it caused the firing of a crooked purchasing agent as supplementary studies analyzed and compared costs and prices purchased by one of the city's departments.

In this particular session, I do not intend to draw up long lists of the successes of data-processing, but would much rather talk to you about the possibilities and the problems which have come about as a result of the introduction of computers.

At the very outset I would like to state my prejudices about the place of computer simulation in administrative planning. Computers can play an important role in this field only if the users of computers truly understand the implications of their simulations. This understanding must be in quantitative terms. It is neither easily nor cheaply attained. Do not underestimate the difficulty of building a bridge between the cold world of statistics and an area in which the chief ingredients are such intangibles as the pursuit of knowledge, a congenial academic atmosphere, loyalty and dedication.

This is why it is generally a good idea to start studies of the educational process by looking at simple and discrete problems and then to build up to a more complex simulation of the whole educational establishment. In this connection three characteristics of the computer are important in determining the scope of these investigations:

1. The computer makes more data available for analysis.
2. The computer makes possible the use of more sophisticated models.
3. The computer eases the numerical solution of problems.

The increased availability of data is probably more important than any other factor in improving the quality of analysis of institutions. In order for an analysis to be useful, it must be broken down along lines meaningful to the users. For example, an educator is interested not only in the number of students in the entering freshman class, but also in the probable distribution of freshmen by major. He may also be interested in daily or weekly reports of acceptances by prospective freshmen. Manual methods do not allow one to easily obtain this kind of detailed information. Computers can and do provide it!

Let us take the familiar problem of forecasting the number of acceptances to be issued by a university to fill the vacancies in a freshman class. The simplest way of forecasting the number of acceptances is to trend the ratio of acceptances mailed out to freshmen enrolled. Many colleges and universities have found to their great distress that this is a bad forecaster of freshman enrollment. The better way may be to segment the freshmen into groups depending upon the occupation of their parents, the residence by state, and the scores which they obtained in the College Entrance Test.

The enrollment of freshmen varies according to the distance of their homes from the college, and to their college entrance scores. Generally, the rate of enrollment of freshmen with high college entrance scores will vary inversely to the distance between the university and their home. This is intuitively reasonable since freshmen with high scores are likely to be accepted by more schools and choose the school closest to them, all other factors being equal. This is especially true of freshmen who come from lower-income families.

If you can forecast not only the number of freshmen who accept your bid, but also their approximate College Entrance Test scores, you can probably get a much better idea of the majors which those freshmen will choose, since freshmen with high scores in mathematics are likely to choose science subjects and those with high scores in English the liberal arts subjects.

If you take the result of the first projection or forecast and use it to forecast enrollment by major, you have already moved away from the single equation model to a multiple equation model. In other words, you have become sophisticated. You may also wish to simulate the results of an error in prediction of 1, 2, 3, or 5% by class of student to see what effect it will have on your plans, both for total enrollment and for a demand for major disciplines.

As a matter of fact, computers can materially assist researchers in the choice of models, and can save them the time and annoyance of computing the results by hand. Some computer programs will even choose the best model.

Since writing this, I have seen a press notice describing the similar model now being tested at the University of Rochester. The variables chosen for examination were: - geographic location, programs of study, needs for financial aid, university ability to grant aid, high school record and College Entrance Tests. The first reports on the model's predictive ability are encouraging.

The University of Rochester model and the model which I have proposed have in common the approach of examining each segment of the freshman population separately. This parallels the approach which has proved successful in forecasting commercial markets.

Ten years ago, I prepared a forecast for the Curtis Committee Report on National Requirements for Aviation Facilties. The parts dealing with the transportation market were carefully processed by population income segment on an early computer. In other words, the propensities of people from different economic segments to buy cars, use buses, trains and airplanes, were carefully examined. The forecasts for new cars, for example, placed the demand for automobiles at 6.8 million units for 1960, and 8 million units for 1965. This is fairly close to the actual demand. By contrast, the forecasts that were made on an aggregate basis and which required less calculation, were much less accurate.

Computers now provide much more leeway than ever before in trying out models. Models are constructed with the help of multiple regression programs which provide the option to select only significant variables and discard the others. Furthermore, programs provide numerous analytical by-products calculated at the time the model is run. If you choose a model with six variables which you intuitively believe will adequately explain the behavior of college entrance applicants, the program for step-wise linear regressions will give you simple correlation coefficients for all the variables and then will calculate the contribution which each one of the variables has made to the forecast. In case you decide to specify that only variables with a prescribed significance--say at the 5 per cent level--may be included in the forecasting model, the rest of the variables are dropped when the forecasting equation is printed. In effect, the computer has retained only those variables which make statistical, as well as intuitive, sense.

A number of programs also print out, as a by-product, such information as the residual sum of squares, standard error of the estimate, the Student t-test, and the Durbin-Watson ratio. This makes it possible to estimate the goodness of fit and to test the statistical soundness of the correlations. Practically every conceivable test of statistical significance can be found in some computer program for some computer, thus giving you a chance to reexamine the postulates on which your model was based.

The past ten years' progress in the understanding of the quantitative relationships which determine the human behavior has brought into use much more sophisticated multiple equation models. The success of these models in planning college and university activities will depend on the right choice of variables.

This is not an idle consideration. Conventional planning procedures will not contribute to this goal. Traditionally, plans of most organizations are a balance sheet of forecasts of outputs and the resources needed to make these forecasts happen. I do not want to criticize this procedure too harshly. There are numerous testimonials by leading executives to the advantages of looking ahead. All too often, organizations which did not look ahead were punished. In some cases, they did not anticipate that a certain product line would peter out. In others, they did not foresee growth. The penalty was that they found themselves short of either plant, people or cash, and had to cut back their activity or take emergency measures with adverse effects on their operation. These observations are just as relevant to business as to academic problems. What happened to engineering enrollments in the 1950's? What is happening to universities with inadequate senior staffs and plants today?

Conventional forecasting and budgeting have no more relationship to planning than doggerel has to poetry. The rhyme is there, but the breadth and rhythm and meaning of a plan are not. A real plan presupposes an element of choice between one activity and another. The happy institution which can grow at an acceptable rate and lay its hands on sufficient resources does not need a plan. There is a parallel for this state of affairs in literature, where it has been said that happy people do not have histories. The most successful organizations are not so happy and do have histories and do need planning.

After one or two cycles of unsophisticated planning, there dawns upon the leadership the realization that forecasts are not cast in stone. Forecasts are based upon assumptions about college age population, rise in enrollments, etc. The larger universities have something to say about some of these variables and can start affecting them through their own actions. The more undergraduate students they admit today, the more graduate students will be around four years hence.

Usually two or three of the simpler planning cycles elapse before an institution gains sufficient experience to move up to more sophisticated planning methods.

The optimization of complex systems does not lend itself to the atomistic analysis generally encouraged by the simpler tools of social sciences. It is much better served by a technique called "activity analysis," borrowed from the military. Certain organizations are dedicated to performing certain tasks. The costs of alternative strategies for performing these tasks are then calculated.

In order to engage in this type of analysis, it is essential to define the mission of the organization. The definition of this mission is neither obvious nor easy. At IBM, we have an intramural joke to the effect that the company manufactures boxes and sells systems, while our customers buy solutions to their problems. The box analogy does not help much in understanding IBM's problems. Unfortunately, we do not know enough about the interaction of customer problems to be able to structure our mission along problem-solving lines. Therefore we have elected to compromise by structuring our mission in terms of systems for groups of customers who are likely to have similar data processing problems. In this way, the Data Processing Division can estimate the level of sales effort, programming support, etc., required to achieve sales targets, as well as get insights into new types of hardware needed to expand the market.

The mission of the DP Division is to analyze and develop data processing markets. Hence it must induce customers to buy or rent the maximum number of systems with a given amount of sales effort. Since the sales effort which IBM can expend has different pay-offs--depending upon the characteristics of customers in various market segments--the Data Processing Division tries to deploy marginal resources in those segments where the pay-off is greatest, similar to strategies used in stock investment.

This deployment cannot be made in a vacuum. It is essential to consider the problem of spill-overs. A system designed for IBM's convenience may not be acceptable to the customer, since it may place impossible strains on his organization. Hence a judgment must be made about the type of systems acceptable to customers, and all other systems solutions may be rejected.

The third, and most difficult phase of planning, consists of choosing those elements of the plan which can be allowed to vary. One cannot start every planning cycle in the atmosphere of the Mad Hatter's party. There are certain rules which IBM, of necessity, adopts. We rule out the possibility of becoming the Sears Roebuck of computing through mail order selling and systems engineering. We weigh seriously our responsibilities to the larger and smaller businesses-- and especially to the defense effort. Within these limits, we decide on different programs, the timing of announcements, and on the adaptation of various technologies to our systems solutions. We then compare the costs of marketing these systems solutions with the revenues which will accrue to IBM as equipment is installed in customer locations.

In summary, we try (1) to define the alternative missions which the company can perform in different market segments, (2) to examine the spill-over effects of adopting a certain mission concept, and (3) to choose the elements and the concepts of the system which will be permitted to vary. The preceding checklist was textually adapted from Hitch & McKean's "Economics of Defense in the Nuclear Age." This volume is fast becoming the bible of the sophisticated corporate planner. The planning process has greatly benefitted from the experience of the military. As a matter of fact, this may be one of the more important extensions of military technology into the commercial field.

All of this detail about IBM experience in planning is vitally important for one to understand so that one knows just what one is minimizing, before one attempts to plan, and to use computers for simulations which evaluate the plan. Let me try to illustrate these points by discussing the implications of the Generalized Academic Simulation Program, colloquially known as GASP. The program was developed at MIT by Mr. Robert Holtz to produce school schedules --primarily for high schools--and has been used in at least one instance, to plan the construction of a campus for a new junior college. GASP has demonstrated that computers can produce a master schedule as well as do all the clerical work of assigning students to sections. (This last task is old hat to many schools).

The program tackles the four-dimensional problem of students, rooms, instructors and time, to produce a schedule which, according to a number of high school principals, (1) results in less conflicts than handmade schedules, (2) reduces the cost and the annoyance of scheduling, (3) produces much more accurate class lists, room utilization lists, and teacher and student schedules, and (4) being modular, gives the principal a large number of preliminary schedules before arriving at a master schedule. Thus a principal can see his problems before they become insurmountable, and by making certain decisions (e.g., scheduling two one-hour practice sessions for the band, rather than one two-hour session) can continuously improve the operation of his school.

The same GASP program has been used quite imaginatively in planning the construction of Meramec Community College in St. Louis, Missouri. Sample student schedules based on a study of California junior colleges were simulated on an IBM 7090 computer to plan the size of the campus for Meramec Community College, designed to accommodate 4500 students.

More than a dozen runs were made with different assumptions about the availability of rooms, their size, etc., to determine a combination which appeared promising, and which, in effect, economized the number of rooms by 22 and reduced the building program from 92 to 70 rooms. The interesting concomitant of the program is that if the simulation is anywhere near realistic, the utilization per room, (i.e., the ratio of used hours to available hours) will be roughly double that of most junior colleges, and nearly 90 per cent of the seating capacity will be utilized in each room, since choice of the type of classroom was also part of the simulation exercise.

Let us praise the planners for their imaginative use of computers, and then take a look at what they have done which would not suit the average liberal arts college. Did they define the mission of their institution realistically? What is the mission of Meramec Community College? To judge from the simulation, it is to process the largest number of students through the smallest number of rooms. Have they examined any spill-overs? What is the effect of teacher schedules which force a teacher to teach one hour, rest two hours, then teach again?

It is true that they did look into how suspension of classes between 12 and 1 could affect facility requirements. They also estimated the cost of setting aside blocks of time for faculty meetings in terms of rooms. But they paid insufficient attention to the problem of teacher convenience. Since this is a new college, practically all the factors can still be varied. The simulation did examine the cost of permitting teachers not to schedule classes before 10 in the morning, and of allowing a certain proportion of the student body to be free after 3:00 P.M.

In order to choose an optimum configuration of rooms, certain assumptions must be made about the costs of scheduling teachers, and the price of not satisfying student requests for schedules. In one simulation run, the weight for rooms is 12, teachers 5, and students 3. This is not a bad ratio for an administration which is suffering from an "edifice" complex. But I will not be satisfied with the results of the simulation unless I can see that classes for given teachers have been scheduled for their convenience. Perhaps a junior college, where the emphasis is on teaching at the expense of scholarship, and where teaching loads are high, can afford to schedule a teacher every three hours five or six times a week. But this would never do at Columbia or Yale, where time for uninterrupted research is jealously guarded.

This does not mean that one should not or cannot use GASP in his schools. Just be careful of the assumptions built into the simulation when GASP is used. Starting with a set schedule which is acceptable to the faculty, GASP can be used to examine the best ways to adapt to change. For instance, if the English department requests that the composition course enrollment be reduced from 40 to 20 pupils per section, the cheapest way of scheduling the new sections may be found by using GASP. One can also foresee the difficulty in scheduling class assignments which may come about if the Dean of the School of Engineering introduces a new required course in computer programming for all freshmen.

I have been trying to warn you that you must look at the output of any simulation with a jaundiced eye, to make sure that you have not forgotten to feed the giant computer some vital assumption which underlies the operation of your institution. It is much too easy to measure the wrong things and to make incorrect conclusions on the basis of irrelevant data. For example, soon after his son was born, a late friend of mine decided to take out more insurance. He went to the insurance company physician for a physical examination. The doctor listened to his heart, took his blood pressure, tapped him here and there, and pronounced him fit. Two weeks later he died of a heart attack. I had occasion to speak to the doctor, who excused himself by saying that he was measuring things which were easy to measure, since there was nothing else to measure.

The majority of institutions and businesses share the doctor's predicament. They measure the easy things. Only a few are taking steps to find out what the truly relevant things may be. I have suggested (1) that in the present environment, the administrator who does not use computers is missing a chance to evaluate many important facets of his operation, and (2) that it is extremely difficult to define what has to be measured.

May I conclude this little sermon with the comment that your best guide will be experience in the use of the computer, coupled with common sense.

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PART II

CONTRIBUTED PAPERS ON FACULTY

Faculty Mobility and Productivity and Achievement

[illegible], Director
Office of Institutional Research
Weber State College

Faculty Perceptions and Changing Institutional Press

Arthur W. Chickering
Coordinator of Evaluation
Goddard College

The Holistic Description of a College Faculty

[illegible]
Director of the Extended Day Program
Chicago Teachers College South

Appraisal of Criteria for Evaluation of Administrative Performance

Richard R. Perry, Director
Office of Institutional Research
University of Toledo

ELWIN F. CAMMACK
WEBER STATE COLLEGE

Solutions to the problems of faculty recruitment and retention are becoming increasingly urgent in a period of rapidly rising enrollments in colleges and universities and a highly competitive market for academic personnel. The shortage of highly trained manpower and the opportunities for employment afforded by business, government and industry are creating critical needs for colleges and universities to reassess their capabilities to acquire and retain staff qualified to carry the responsibilities of higher education. Although research on student populations has been extensive during the past decade or two, relatively few attempts have been made to study programs and policies related to college and university faculties. Studies of conditions of employment and service and of job satisfactions should become common practices in American higher education. If institutions of higher education are to achieve a level of excellence, they must obtain and retain the services of faculty members who are capable of insuring the achievement of the goal of excellence.

The President's Committee on Education Beyond the High School, in 1957, stated that:

> The most critical bottleneck to the expansion and improvement of education in the United States is the mounting shortage of excellent teachers. Unless enough of the Nation's ablest manpower is reinvested in the educational enterprise, its human resources will remain under-developed and specialized manpower shortages in every field will compound. Unwittingly the United States right now is pursuing precisely the opposite course. Demands for high quality manpower have everywhere been mounting, but the colleges and universities have found themselves at a growing competitive disadvantage in the professional manpower market.[1]

Stecklein, who has pioneered in the area of faculty studies with research conducted at the University of Minnesota, said, "In my opinion, the problem of quality in staffing our colleges is more serious than any of the other problems created by the huge increase in college-age population and the continually increasing clamor for college education."[2] He suggests that the problem of faculty recruitment and motivation has two dimensions, "(1) problems of recruiting people into college teaching in general, and (2) problems of attracting and holding college faculty members in a particular institution or a particular type of institution." Logan Wilson, currently president of the American

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[1] *The President's Committee on Education Beyond the High School, Second Report to the President*. (Washington: U.S. Government Printing Office, 1957), p. 5.

[2] John E. Stecklein, "Research on Faculty Recruitment and Motivation," *Studies of College Faculty*. Western Interstate Commission for Higher Education, (Boulder: 1961), p. 11.

Council on Education, believes that, "The 'here today and gone tomorrow' attitude which some institutions force upon their faculties gives no opportunity for group coherence and morale to develop, and where there is no reasonable continuity, membership is consequently devalued."[3] In 1957, the Educational Policies Commission stated that, "Recruitment and maintenance of outstanding faculties is the most urgent, and in many ways most difficult, problem of higher education in current years."[4]

The limited research in the area of quality of faculties and factors related to the abilities of institutions to attract and retain faculty members has pointed up the need for further investigation of the interrelationships between faculty attraction and retention and quality. The study reported in this paper was designed to relate the perception of an academic position held by faculty members of Michigan State University to measures of faculty productivity and achievement.

A major purpose of the investigation was to determine if faculty members at different levels of productivity and achievement attach varying degrees of significance to different aspects of an academic position. The accomplishment of this objective was dependent upon the construction of a somewhat valid measure of faculty productivity and achievement. Authorities are in general agreement that certain types of activities and accomplishments are typical of outstanding faculty members.

Lazarsfeld and Thielens, in their study of social scientists, used a "productivity index" computed by assigning one point for each of the following: (1) has written a dissertation; (2) has published at least one paper; (3) has read three or more papers at professional meetings; and (4) has published at least one book. Those social scientists with a score of "3" or "4" were classified as the high group, those with a score of "2" as the medium group, and those with a score of "1" were in the low group. An "honors index" was also used in which one point each was given for: (1) has a Ph. D.; (2) has published three or more papers; (3) has held office in a professional society; and (4) has worked as a consultant.[5]

The determination of a composite measure of the activities and accomplishments which could be assumed to be a reliable measure for this study was considered to be an empirical problem. The problem was reduced to one of providing answers to the following questions:

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[3] Logan Wilson, The Academic Man. (New York: Oxford University Press, 1942), p. 59.

[4] Educational Policies Commission, Higher Education in a Decade of Decision. (Washington: National Educational Association, 1957), p. 150.

[5] Paul F. Lazarsfeld and Wagner Thielens Jr., The Academic Mind. (Glencoe, Illinois, The Free Press, 1958), p. 403.

(1) Are there faculty activities and accomplishments which can be grouped together in a specified pattern which produce one or several different factors contributing to a composite numerical score?

(2) Is there a total numerical score based on scaling and combining these several activities and achievements which is a reliable measure of a faculty group characteristic? It was assumed, for the purposes of the study, that there do exist activities which serve as valid indicators of faculty productivity and achievement.

Data on rank, salary, number of publications of various types, membership in learned societies and professional organizations, offices held in learned societies and professional organizations, public service activities, doctoral candidates for whom the faculty member has served as major advisor, masters candidates for whom the faculty member has served as major advisor, and service on university and college committees were obtained from responses to a questionnaire. These data were scaled, arbitrarily.

Based upon scaling as described above, the solutions to the two questions posed were sought through the use of factor analysis techniques and a modification of the Kuder-Richardson reliability formula. First, an inter-correlation matrix was computed for the nine variables: rank, salary, publications, learned society and professional organization membership, offices held in learned societies and professional organizations, public service activities, number of doctoral candidates, number of masters candidates, and university committee activities. The inter-correlation matrix revealed that only rank and salary and the number of doctoral advisees and masters advisees were correlated at a level greater than .50. The data were then analyzed by the use of principal-components analysis. Varimax rotation procedures were used with the Kiel-Wrigley[6] criterion as the control for number of variables rotated. It was found that the dimensionality of the set of nine variables could be reduced to a more manageable four-dimensional space. As has been stated previously, the nine variables were relatively independent of each other as was indicated by the inter-correlation matrix; hence it was not possible to greatly reduce the dimensions required to define the domain under investigation. The four dimensions were: X_1, which consisted of the compensations variables rank and salary; X_2, which consisted of the student advisory variables, the number of doctoral and masters candidates; X_3, which consisted of the professionalism variables, the number of publications and memberships and offices held in learned societies and professional organizations; and X_4, which consisted of the service variables of public service activity and college and university committee assignments.

The answer to the second question posed was sought through the application of a reliability test developed by Hoyt for which the "coefficient of reliability gives the percentage of variance in the distribution of test scores that may be regarded as true variance, that is, as variance not due to the

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[6] Harry H. Harman, Modern Factor Analysis. (Chicago: University of Chicago Press, 1960), p. 90.

the unreliability of the measuring instrument."[7] The formula used was

$$r_{tt} = \frac{k}{k-1} \left[1 - \frac{\Sigma V_i}{V_t} \right] \quad \text{where}$$

V_i = variance of item i

V_t = variance of subjects' scores

and $\frac{k}{k-1}$ is a factor which compensates for the length of the measuring instrument. Application of the test to the measures of faculty productivity and achievement produced an internal consistency reliability score of .681. The score clearly suggests that there exists a commonality in the measure.

The sample was divided into two groups, the "high group" and the "low group" according to scores on each of the measures X_1, X_2, X_3, and X_4, and according to a total score. These groupings served as a basis for analysis of responses to a list of forty-six factors which were included in the questionnaire.

Factors to which the faculty members were asked to respond covered the general areas of intellectual climate, physical facilities and services, professional function, economic compensations, institutional prestige, and the university community. Faculty members were asked to rank each factor according to the relative importance of the factor to the faculty member in the selection of and/or remaining in any academic position. A three-level scale was used: not significant, slightly significant, and very significant.

The sample consisted of all faculty members appointed to the University staff during the period from June 1, 1953, through September 1, 1955, under the tenure regulations and who were still employed as of January 1, 1964. One-hundred thirty-nine faculty members appointed during the two year period were still employed as of January 1, 1964.

Chi-square distributions were used to determine if differences existed between the way in which the high and low productivity groups of faculty members viewed the checklist of forty-six factors relevant to the selection of any academic position. Since the purposes of the statistic were to determine whether or not differences in opinion existed rather than to make decisions about hypotheses, a ten per cent (.10) level of significance was considered adequate.

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[7] Cyril Hoyt, "Test Reliability Estimated by Analysis of Variance," Psychometrika, VI (June, 1941), pp. 153-160.

It was found that faculty members high on the total productivity and achievement measure attached greater significance to (1) the availability of graduate and research assistants; (2) the availability of research funds; (3) financial aid for the publication of research; and (4) time for research than did those faculty members low on the scales. Those factors for which significant difference existed and which were more important to faculty members low on the productivity and achievement scales included (1) policies on promotion; (2) faculty participation in academic policies; (3) salary; (4) tenure policies; (5) classrooms; (6) relative teaching-research emphasis of the department; (7) choice in teaching assignment; (8) recognition for undergraduate teaching; (9) quality of the student population; (10) educational opportunities of the community; (11) congeniality of the community; and (12) proximity to immediate family. Fewer differences were found between high and low groups of faculty members as determined by the various components of the productivity and achievement measure. However, where differences existed, the high group of faculty members attached greater significance to factors related to research while the low group tended to be more concerned with tenure policies, promotion, channels of communication, and factors directly related to teaching.

The ten factors considered to be most important in the selection of an academic position by the total group of faculty members as determined by mean scores were: (1) relationships with department chairmen; (2) calibre of associates; (3), (4), and (5) academic freedom, the library, and teaching load; (6) reputation of the department; (7) and (8) salary and income potential; (9) time for research; and (10) choice in teaching assignment.

Although the measures of productivity and achievement used in the study were, admittedly, subject to definite limitations, the circular "cause and effect" relationships found to exist lend validity to these measures. This conclusion was supported by findings that faculty members who were purported to be highly productive in specific functions were also found to express concern for the opportunity to continue in this function professionally. Hence, colleges and universities may be aided in the development of a quality staff, according to the criteria of the institution, by three somewhat obvious steps. First, the institution must determine the objectives toward which the efforts of the faculty member will be directed. Second, the institution must select prospective faculty members on the basis of their interest in these specific objectives rather than a general interest in the life of the academician. It is at this step that a reduction in the conflict of interest between the purposes of the institution and a faculty member's recognition within a specific discipline might be accomplished. This phenomenon was observed in the present study as well as in many other studies of faculty. Third, the institution must provide the facilities and resources necessary to allow faculty members to work toward institutional objectives.

A major result of the study has been the re-affirmation of the complexity of the academic market. Due to the extreme diversification of functions performed by faculty members in highly complex institutions, isolation of conditions which explicitly describe faculty job satisfactions and the interrelationships between these conditions and faculty productivity and achievement becomes a Herculean task. It is not the intent, however, to infer that the problem of studying the academic man and his role in institutions is such that it is devoid of reward. Rather, it is to suggest that the study of college faculties is a fertile area for research and one which has vast implications for the future of higher education.

TABLE 1

TENURE, SALARY, AND RELATED COMPENSATIONAL FACTORS, ANY ACADEMIC POSITION PRESENT FACULTY MEMBERS (N=90)

	Measure of Productivity and Achievement				
Factors	Service Component	Professionalism Component	Advising Component	Compensational Component	Total Measure
Salary	X^2=5.397 (A)	. .	. .	. .	X^2=9.318 (A)
Income potential	. .	. .	. .	. .	. .
Fringe benefits	. .	. .	. .	. .	. .
Financial assistance for publication of research	. .	. .	. .	. .	X^2=4.813 (B)
Financial assistance for attending professional meetings	. .	. .	. .	. .	. .
Tenure policies	X^2=8.403 (A)	. .	X^2=10.420 (A)	X^2=11.698 (A)	X^2=9.535 (A)
Opportunity for consulting work	. .	. .	. .	X^2= 4.620 (A)	. .
Rank and title	. .	. .	. .	. .	. .
Cost of housing	. .	. .	X^2= 4.961 (A)	. .	. .

Note: A indicates low group attached greater importance to factor in the selection of any academic position than high group.

B indicates high group attached greater importance to factor in the selection of any academic position than low group.

.10 level of significance for X^2- distribution, X^2- > 4.605, d.f. = 2.

TABLE 2

NATURE AND EXTENT OF WORK LOAD
ANY ACADEMIC POSITION
PRESENT FACULTY MEMBERS
(N=90)

	Measure of Productivity and Achievement				
Factors	Service Component	Professionalism Component	Advising Component	Compensational Component	Total Measure
Teaching load	. .	X^2= 5.067 (A)	. .	. .	. .
Time for research	. .	X^2= 5.454 (B)	X^2= 6.355 (B)	. .	X^2= 6.288 (B)
Recognition for undergraduate teaching	. .	X^2=10.367 (A)	X^2= 6.884 (A)	X^2= 5.991 (A)	X^2=11.643 (A)
Committee Assignments	. .	. .	. .	. .	. .
Level of teaching assignment	X^2=5.965 (A)	. .	. .	. .	. .
Relative teaching-research emphasis of department	X^2=6.506 (A)	. .	. .	. .	X^2= 6.810 (A)
Choice in teaching assignment	. .	. .	. .	. .	X^2= 5.956 (A)
Extra-load activities	. .	. .	. .	. .	. .
Teaching aids	. .	. .	. .	. .	. .

Note: A indicates low group attached greater importance to factor in the selection of any academic position then do the high group.
B indicates high group attached greater importance to factor in the selection of any academic position than do the low group.
.10 level of significance for X^2-distribution, $X^2 > 4.605$, d.f. =2.

TABLE 3

ADMINISTRATIVE ATTITUDES
ANY ACADEMIC POSITION
PRESENT FACULTY MEMBERS
(N=90)

	Measure of Productivity and Achievement				
Factors	Service Component	Professionalism Component	Advising Component	Compensational Component	Total Measure
Academic freedom	. .	. .	. .	. .	. .
Recognition for undergraduate teaching	. .	X^2=10.367 (A)	X^2= 6.884 (A)	X^2= 5.991 (A)	X^2=11.643 (A)
Policies on promotions	. .	X^2= 5.409 (A)	X^2= 6.326 (A)	X^2= 9.948 (A)	X^2= 8.865 (A)
Sabbatical leave policies	X^2= 5.823 (A)	. .	. .	. .	. .
Size of university	. .	. .	. .	. .	. .
Traffic and parking	. .	. .	. .	. .	. .
Faculty participation in academic policy	. .	. .	X^2= 6.434 (A)	X^2= 5.537 (A)	X^2= 6.031 (A)
Channels of communications	. .	. .	. .	X^2= 5.110 (A)	. .
Relationships with department chairmen	. .	. .	. .	. .	. .

Note: A indicates low group attached greater importance to factor in the selection of any academic position than do the high group.

B indicates high group attached greater importance to factor in the selection of any academic position than do the low group.

.10 level of significance for X^2- distribution, $X^2 > 4.605$, d.f. = 2.

TABLE 4

QUALITY OF STUDENT POPULATION AND PRESTIGE OF INSTITUTION
ANY ACADEMIC POSITION
PRESENT FACULTY MEMBERS
(N=90)

		Measure of Productivity and Achievement				
		Service Component	Professionalism Component	Advising Component	Compensational Component	Total Measure
Factors	Quality of student population	. .	. .	. .	. .	$X^2 = 6.029$ (A)
	Calibre of associates	. .	. .	. .	. .	. .
	Prestige of university	. .	. .	. .	. .	. .
	Reputation of your department	. .	. .	. .	. .	. .

Note: A indicates low group attached greater importance to factor in the selection of any academic position than do the high group.
B indicates high group attached greater importance to factor in the selection of any academic position than do the low group.
.10 level of significance for X^2-distribution, $X^2 > 4.605$, d.f. =2.

TABLE 5

PHYSICAL FACILITIES AND RESOURCES
ANY ACADEMIC POSITION
PRESENT FACULTY MEMBERS
(N=90)

Factors	Measure of Productivity and Achievement				
	Service Component	Professionalism Component	Advising Component	Compensational Component	Total Measure
Office space	$X^2= 7.343$ (A)	$X^2= 5.563$ (A)	. .	. .	. .
Classrooms	. .	. .	. .	. .	$X^2= 6.119$ (A)
Library	. .	. .	. .	$X^2= 4.864$ (A)	. .
Secretarial services	. .	. .	. .	. .	. .
Technical Assistance	. .	. .	$X^2= 5.151$ (B)	. .	. .
Availability of graduate and research assistants	$X^2= 6.035$ (A)	$X^2= 5.695$ (B)	$X^2=13.650$ (B)	. .	$X^2=11.879$ (B)
Availability of research funds	. .	. .	$X^2= 4.764$ (B)	. .	$X^2= 6.573$ (B)

Note: A indicates low group attached greater importance to factor in the selection of any academic position than do the high group.
B indicates high group attached greater importance to factor in the selection of any academic position than do the low group.
.10 level of significance for X^2- distribution, $X^2 > 4.605$, d.f. =2.

TABLE 6

CULTURAL, RECREATIONAL, AND EDUCATIONAL OPPORTUNITIES
AND PERSONAL FACTORS
ANY ACADEMIC POSITION
PRESENT FACULTY MEMBERS
(N=90)

Factors	Service Component	Professionalism Component	Advising Component	Compensationsl Component	Total Measure
Cultural opportunities in community	. .	. .	. .	. .	. .
Recreational opportunities in community	. .	. .	. .	. .	. .
Educational opportunities of community	. .	X^2= 6.742 (B)	. .	. .	X^2= 5.486 (A)
Congeniality of community	. .	X^2= 6.782 (A)	X^2= 6.096 (A)	. .	X^2= 4.844 (A)
Congeniality of staff	. .	. .	. .	. .	. .
Climate of area	. .	. .	. .	. .	. .
Commuting	. .	. .	. .	. .	. .
Proximity to family	. .	. .	X^2= 6.922 (A)	. .	X^2= 7.173 (A)

Note: A indicates low group attached greater importance to factor in the selection of any academic position than do the high group.

B indicates high group attached greater importance to factor in the selection of any academic position than do the low group.

.10 level of significance for X^2- distribution, $X^2 > 4.605$, d.f. =2.

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The College Characteristics Index (CCI) has proven a useful instrument for assessing and describing differences in campus atmospheres (Pace and Stern, 1958; Pace, 1960; Stern, 1961), for appraising the significance of other aspects of the college environment (Astin & Holland, 1961; Astin, 1963), and, in conjunction with other measures, for studying the relationship between institutional press and student development (Pace, 1962; Thistlethwaite, 1960; Stern, 1962). The research reported here had as its initial purpose assessment of the educational climate at Goddard College as part of a broader program of institutional evaluation. The findings from the initial studies and from those which followed have implications for two areas: a) they suggest adoption of a more complex view of institutional press, and raise some methodological questions for those using the CCI; and b) they shed light on the problem of indifference to things intellectual encountered among some college populations, and on the role the faculty view may play in relation to this problem.

The data for the initial studies came from two groups of first and second year, or Junior Division (Jr. Div.) students, and one third and fourth year, or Senior Division (Sr. Div.) group. The Jr. Div. groups (N=41 and N=33) completed the CCI at home before coming to college and again four semesters later in May; group 14A took the test in 1960 and 1962, 14B in 1961 and 1963. The Sr. Div. group (N=10) completed the CCI at the end of their fourth semester in 1961, and again at the end of their final one in 1963. Table 1 presents the mean scores for these three groups for each testing; it includes the scales relevant to "intellectual climate" as measured by the CCI and is organized according to the four components described by Stern (Stern, 1961). The differences were examined by means of the t test, as described in Walker and Lev (1953).

On the first component, Substantive Intellectual Interests, the data are consistent for Jr. Div. students. On four of the five scales the decline in scores exceeds that which might be expected by chance. Intellectual activities are not as reinforced or as valued as expected at entrance. For the Sr. Div. group, although only the Understanding and Science scores drop significantly, there is a negative shift on all the other scales.

The pattern of results for Academic Motivation is little different. For both Jr. Div. groups the pressures and the rewards for high academic achievement, for hard work, and for sustained and systematic effort are perceived to be significantly less than expected at entrance. Significant change occurs less frequently for the Sr. Div. group, but all the shifts are in the same negative direction.

The results for Social Effectiveness, while clearly indicating a general decline, are more complex. The press for social action and idealistic social concern remains high and relatively unchanged for the Jr. Div. students; for

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[1] This research is part of a six year Experiment in College Curriculum Organization at Goddard College supported by the Ford Foundation.

Table 1

Intellectual Climate

	14A		14B		16	
	1st	2nd	1st	2nd	1st	2nd
1. Substantive Intellectual Interests						
Humanism:	8.8	7.2*	8.7	7.6*	7.6	7.2
Reflectiveness:	8.4	6.9*	8.4	7.3*	7.2	6.8
Understanding:	8.5	6.9*	8.3	6.9*	7.6	6.6^{o}
Sensuality:	8.0	7.3^{o}	7.8	7.8	7.2	7.5
Science:	6.5	2.9*	5.9	3.4*	4.0	2.6^{o}
Total:	40.2	31.2	39.1	33.0	33.6	30.7
2. Academic Motivation						
Energy-Passivity:	8.2	6.8*	8.3	6.7*	7.0	6.3
Achievement:	6.6	6.3	7.8	5.7*	6.3	6.2
Counteraction-Inferiority Avoidance:	6.6	5.8^{o}	6.4	5.3	3.9	4.4
Conjunctivity-Disjunctivity	6.2	2.8*	6.3	3.5*	5.9	4.1^{o}
Total:	27.6	21.7	28.8	21.2	23.1	21.0
3. Social Effectiveness						
Ego Achievement	7.3	7.0	7.3	7.0	7.7	7.0^{o}
Exhibitionism-Inferiority Avoidance	7.1	5.6*	6.5	5.8^{o}	5.8	5.2
Emotionality-Placidity	7.2	7.1	7.3	6.5^{o}	7.6	6.2^{o}
Total:	21.6	19.7	22.1	19.3	21.1	18.4
4. Self-Assurance						
Fantasied Achievement-Fantasy Denial	6.0	5.6	6.5	5.6^{o}	5.6	4.8
Change-Sameness	7.6	7.2	8.0	7.9	6.9	7.9^{o}
Assurance-Abasement	9.1	8.7*	8.9	9.1	9.4	8.7
Restiveness-Deference	8.1	8.5	8.2	8.5	8.9	9.0
Objectivity-Projectivity	8.9	7.8*	9.3	8.4*	8.1	7.9
Total:	39.7	37.8	40.9	39.5	38.9	38.3
Total Intellectual Climate	129.1	110.4	130.9	113.0	116.7	108.4

^{o} = .95 - .975 * = greater than .99

for Sr. Div. students there is some decline in this dimension. By contrast both groups of Jr. Div. students perceive less emphasis on self-display and public performance than they did at entrance, while the shift for Sr. Div. students, though also in the negative direction, does not reach statistical significance. Perception of the value placed on open emotional display also shifts in the negative direction; one Jr. Div. group and the Sr. Div. students see calmness and restraint to be more reinforced than they did two years earlier.

The data for Self-assurance, the fourth component of intellectual climate, show no definite trend. On two of the five scales no group shows significant change, and on two others change is found in but one group. On only one scale the Jr. Div. groups agree; they both come to see the faculty as less detached and unprejudiced than they had anticipated. On one of these scales there is the only instance of change among Sr. Div. students different from that for the Jr. Div.; 16's perceive flexibility and variability to be more highly valued than they did as 14's.

Comparison of the four components--Substantive Intellectual Interests, Academic Motivation, Social Effectiveness, and Self-Assurance--indicates that the major shift occurs in the first two. Behavior reflecting intellectual interests and activity and hard work in academic areas for the fourth semester student is less frequently reinforced and satisfying than he anticipated when he entered. In Component 3, Social Effectiveness, the decline is less marked, and in Component 4, Self-Assurance, the data suggest no clear change. In general, it seems clear that during the Jr. Div. years Goddard's intellectual climate becomes more temperate. The heat and light anticipated at entrance becomes cool and cloudy after four semesters. And the weather does not change much during the Sr. Div. years.

Table 2 is similar to Table 1 except that it includes scales not so directly relevant to "intellectual climate"; the components are those of Stern (1961). For the first component, Friendliness, change is consistently in the negative direction for both Jr. Div. groups, and in six of the eight possible cases the magnitude reaches satistical significance. Dependent, nurturant, and playful behaviors are not as reinforced as was expected. The Sr. Div. group shows no significant change.

Most of the change on Constraint is contributed by the first four scales. Both groups of Jr. Div. students show significant decrement in their perception of the importance of order, personal appearance, and planning and organization; on the two scales most directly related to order and organization, 16's also show significant decrement. The data from the scales in the Dominance-Submission component are somewhat conflicting. Both Jr. Div. groups come to see the faculty as more irrational and prejudiced, and, along with the Sr. Div. group, find self-assertive and controlling behavior more acceptable than they did two years earlier. On the other hand, one Jr. Div. group and the Sr. Div. group perceive the faculty as less critical than at the earlier testing. Examination of the items on the Adaptability-Defensiveness scale suggests an explanation for this difference; several items concern the use of grades, exams, and assignments as instruments of domination. At schools where such devices are used, the nature of their use probably coincides with the general vector assesed by this cluster. At Goddard where such devices are not used and students

Table 2

Non-Intellectual Climate

	14A		14B		16	
	1st	2nd	1st	2nd	1st	2nd
1. Friendliness						
Affiliation-Rejection	6.7	6.4	8.2	7.1*	7.1	7.1
Nurturance-Rejection	6.9	4.7*	6.5	5.9	5.2	4.6
Supplication-Autonomy	6.0	5.1*	6.1	5.3^{o}	5.4	4.9
Play	4.8	4.0^{o}	5.6	5.1^{o}	2.0	2.0
Total:	24.4	20.2	26.4	23.4	19.7	18.6
2. Constraint						
Order	3.7	3.0^{o}	4.2	3.4^{o}	4.3	3.3*
Narcissism	2.8	1.5*	2.9	1.8*	1.9	1.9
Conjunctivity-Disjunctivity	6.2	2.8*	6.4	3.5*	5.9	4.1^{o}
Blamavoidance-Aggression	7.0	3.6*	6.7	3.7*	3.9	3.2
Deference-Restiviness	1.9	1.5	1.8	1.5	1.1	1.0
Practicalness	4.4	3.3*	3.9	3.8	3.4	2.9
Deliberation-Impulsiveness	3.3	2.7	2.9	1.9*	3.6	2.8
Total:	29.3	18.4	28.8	19.6	24.1	19.2
3. Dominance-Submission						
Dominance	3 3.1	4.0*	2.8	4.2*	3.2	4.1*
Projectivity-Objectivity	1.1	2.2*	.7	1.6*	1.9	2.1
Abasement-Assurance	.9	1.3*	1.1	.9	.6	1.3
Adaptability-Defensiveness	2.7	2.3	3.4	2.6*	3.1	2.2^{o}
Total:	7.8	9.8	8.0	9.3	8.8	9.7
Total Non-Intellectual Climate	61.5	48.4	63.2	52.3	52.6	47.5

^{o} = .95 - .975 * = greater than .99

respond more in terms of the general orientation and values of the teachers, these scores may shift at variance with the other scales.

The evidence is clear that there are major shifts in the student's perception of the college as he moves through it, that the institutional image is quite different for the entering student, for the second year student, and for the fourth year student. The greatest shifts occur in the intellectual climate, but elements of the non-intellectual climate also change from grade to grade. To what may these changing perceptions be attributed? What influences the direction of change? What operates to prompt the changing configurations which appear at different points in the college experience?

There are, of course numerous aspects of the environment which might be examined for their relevance to such questions; a choice must be made. On the basis of theory, personal observation, and earlier research, (Eddy, 1959; Jacobs, 1957; Pace, 1962), it seemed that an element of singular importance is the faculty's perception of the college--that changes in the student's view of the college are influenced by the faculty's view. Not only is this view communicated directly to students as they talk with faculty members, but more important, a faculty member's own behavior is largely determined by his perception of the institution, what it is trying to do, how it works, what kinds of students it attracts, and what his own responsibilities should be. Thus the nature of the institution itself, if one can speak realistically about such a thing, is highly determined by the faculty's perceptions of it. Such a rationale led to the hypothesis that as students move through the college, their perceptions of it approximate more and more closely those of the faculty that the shifts which occur bring the students closer to the faculty view. In substance this hypothesis suggests that when, after two years, students perceive less press for intellectual activities, for academic achievement, and for friendly and reciprocal relations, they are simply moving toward the faculty's perception of the importance of such things at the college.

Procedure

To enable this study and other to proceed during the spring semester of 1963, the thirty-four full-time faculty members were asked to complete the CCI. Thirty-three turned in usable answer sheets, and means and standard deviations were computed for each of the thirty scales. This set of mean scores for the faculty was then correlated with each of the six sets of scores for the three student groups, and it was hypothesized that for each group the correlation coefficient for the scores from the second testing would be higher than from the first. The equality of the pairs of correlation coefficients was tested by means of the procedure described in Walker and Lev (1953, Pp 255-256). This procedure was carried out for the total set of thirty scores, and then again separately for the scale scores relevant to intellectual climate and to non-intellectual climate. The classification of scales into one factor or the other followed the framework described in Stern, (1963, Pp. 18-19); scales for the second order factor of self-expression were included under intellectual climate only.

Results

Table 3 presents the correlation coefficients and the approximate probabilities that the differences between them are due to chance. Figures are given for the total instrument and for the two major sub-factors. These results clearly support the major hypothesis. In all cases the correlation coefficients are higher on second testing than at the first; five of the nine cases reach probabilities beyond the .05 level. It is clear too that the major shift occurs in perception of the intellectual climate; the discrepancy between the student and faculty view at first testing is much greater than in the non-intellectual area. The data also indicate that while the change is somewhat greater for the Jr. Div. groups, change also occurs for the Sr. Div. group.

Table 3

Student - Faculty Scale Scores Correlated

	14A			14B			16		
	1st	2nd	P	1st	2nd	P	1st	2nd	P
Total	.88	.96	.030	.89	.96	.030	.89	.95	.055
Intellectual Climate	.43	.89	.006	.45	.87	.015	.63	.91	.020
Non-Intellectual Climate	.84	.95	.120	.87	.94	.220	.88	.94	.200

Now it should be kept in mind that the correlational procedures only provide a comparison of profiles. It has been found that as students move through college their scale score profiles become closer to that of the faculty, closely approximating the hierarchy of presses as seen by the faculty. But there is also a question of absolute level of scores. Students may come to agree with the faculty on the relative importance of meat, potatoes, and vegetables, yet they need not necessarily value food as much. Similarly, students may come to order the elements of the college press in a way more similar to the faculty, while their perception of the level of press remains at, or changes to, a level different from the faculty.

Table 4

Mean Scores

Faculty & Students

	Students			Faculty
	At Entrance	Grade 14	Grade 16	
Total	192.3	164.5	155.9	168.4
Intellectual Climate	130.0	113.4	108.4	113.6
Non-Intellectual Climate	62.3	51.1	47.5	54.8

Table 4 shows the average scores by grade level for the subjects of this study and for the faculty. In this table the scores for the groups of entering students and grade fourteen students have been averaged. Observation of the total scores for intellectual and non-intellectual climate on Tables 1 and 2 indicates little variation among the entering and second year groups so the simplification achieved by averaging does no violence to the picture presented. The similarity between the faculty scores and those for grade fourteen are apparent for both intellectual and non-intellectual climate. At entrance, students perceive the level of press to be substantially higher than the faculty; by the end of two years their view is similar to that of the faculty; and at graduation they perceive the press to be notably less than the faculty.

Do the student's shifting perceptions of the college approximate more and more closely the faculty view? The answer seems to be clearly yes. Students come to see some kinds of press as relatively greater than others, and their perceptions of the hierarchical relationships fit the faculty view better and better as they move up through the grades. In another sense the answer is less clear. Entering students see activities in both the intellectual and non-intellectual sphere to be valued much more highly than do the faculty, and by the end of two years their perceptions have been modified and are congruent with that of the faculty. However, change in perceptions apparently continues during the last two years, so that by graduation, students perceive much less press in the intellectual and non-intellectual areas, moving away from the faculty view.

Discussion

Does it make sense to talk of institutional press as though it had an abstract reality, as though there was something there that exists for a given institution? If the differences among individuals are compounded by systematic shifts from grade level to grade level, what does it mean to talk about the "institutional press"? If the college perceived by the senior is quite different from that perceived by the freshman, is it useful to construct an abstract different from both?

For some purposes it is. Institutional climates differ, and if one wishes to describe differences among colleges, the simplification gained by presenting a general picture may warrant the abstraction. But in collecting data for such a picture, care should be taken to sample representative students at all grade levels, and it should be recognized that the resulting figures probably do not fit very precisely any group within the school.

But for research on the relationship between need and press, or on the relationship between student development and institutional climate, consideration of institutional press in general is probably less useful and indeed may be misleading for some groups of students. It is probably more helpful to look at the relationships for students at particular grade levels to discover what kinds of incongruities are greatest at what points; the disparities which are large at one point may be quite small at another. In this fashion the processes of interaction between student and college may be more clearly understood.

There is an additional complexity which must be taken into account. Institutional press comprises two different elements which may vary independently. On the one hand there is the relative strength of various kinds of press, and on the other hand there is the absolute level of press at a given time. The student is continually making judgments about both. He asks "What is important; aesthetics or athletics, social conscience or sociability, work or play?" And he also asks, "How much emphasis is placed on those things ranked highest? Must one be unremittingly intellectual? Must one go to every party and ball game? Or is a more moderate level of response appropriate or adequate?" Because these two elements may vary independently, research on institutional press will be more fruitful if a more complex view is adopted.

These findings also have important implications for education. Changes in perception deserve thoughtful attention, for the student behaves in response to his perceptions, and as his perceptions change so does his behavior. With modification of behavior a different stream of experience flows into the changing pool of personality, and the pool is altered. Thus are personality development and perception interwoven, and thus institutional impact is closely related to students' perceptions.

More concretely, upon arrival students frequently see the college as a place where intellectual activities are highly valued and where there is difficult and copious work to be done. Challenges will be offered not formerly encountered. By the end of two years this view is substantially moderated, and moderated further still after four. Is the "sophomore slump," the sharp decline in performance after the enthusiasm at entrance, simply a reflection of disillusion, of the collapse of expectations unmet? It may be. When seniors perceive significantly less press than sophomores or freshmen, is the growing indifference to things intellectual seen on many college campuses a response to continuing disenchantment, to the cumulative experience of abilities untested, of capacities unstretched? The congruence between the level of press seen by the faculty and that seen by the second year students may be instructive. Is this another example of educational practice aiming at the mid-point, of serving "the average student"? If so, this average seems lower than that for which the entering student is ready, and becomes relatively lower still with the increasing ability of the students during the junior and senior years. It seems likely that more challenging and rigorous experiences can be offered the entering student and that expectations for performance can be increased safely from year to year to keep pace with the development of the students.

Pace says, "about 30 per cent of the distinctive environment of a school is accounted for by the distinctive character of the students it admits. This leaves most of the potential impact ... up to the ... faculty administration, and trustees. Environmental press is clearly more than the student culture alone." (Pace, 1962 Pg. 56). The general thrust of that statement is certainly supported by the evidence from this research. Student culture may be more malleable than has been thought. The real difficulty may lie in modifying the faculty's view of the institution, of the students, and of its own role and capabilities. Perhaps efforts to change the intellectual climate by direct attacks on the student culture have been misguided.

In summary, it may be said that the dimensions of disillusionment for the college student are more than few, and that they are to some extent related to the faculty view of the institution. Research to assess the impact of changing educational practice should examine students at different grade levels separately, and should attend not only to the existent hierarchy among elements of the institutional press, but also to variations in the absolute level of different kinds of press.

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ILLINOIS TEACHERS COLLEGE

This paper is extracted from a larger empirical inquiry into the nature of a college faculty.[1] The college studied was the Chicago City Junior College, the largest junior college in the United States with nearly 30,000 student registrants in 1962. The 1962 faculty number 416 full time members with 63 part time personnel on the teaching staff. In terms of level of academic preparation, the staff did not typify the junior colleges in the United States, resembling in some ways the faculties of four year liberal arts and sciences colleges. In fact, the curriculum of this junior college in 1962 was essentially one in liberal arts and sciences. Table No. 1 provides a more accurate description for comparison.

In 1962, the Chicago Board of Education introduced the professorial rank system into the Chicago City Junior College.[2] This occasion brought the opportunity to evaluate the faculty in its assignment to professorial ranks in terms of the criteria stated for that assignment. The research on this aspect is reported elsewhere.[3] However, the data gathered made it possible to describe an entire faculty in behavioral terms. Indeed, the empirical verification of the college professor's career cycle was made possible in terms of a behavioral model.

The empirical data upon which this paper is based has a "shape" which is here labeled "a behavioral model of a college faculty." The term "model" is used here in the sense of a relatively simple structured form which represents a given concept. In this case, the concept is the notion that a college faculty is a guild which institutionally manifests within itself certain discernible professional behaviors.[4] To this end, the measure professional behaviors appropriate to the guild of collegiate faculty are gathered together in a given order to be described later. These guild behaviors are seven in number: (1) the number of published books per faculty member; (2) the number of published journal articles per faculty member; (3) the number of academic awards per faculty member; (4) the number of years of college teaching per faculty member; (5) the number of professional organizational memberships per faculty member; (6) the number of professional activities per faculty member; and (7) academic improvement activity: yes or no, per faculty member. There is little doubt that there are other behaviors which are manifested by the guild of professionals in academia. However, the seven listed above are the ones which were available through the data sources.

The ranking of the faculty into the professoriate was based upon self-report forms which were completed by every faculty member. From these forms, some 33 variables were collected. These data were coded into IBM cards, one for each faculty member. The behavioral model of the college faculty is based upon the Pearson correlations between the seven professional behaviors given above and the academic ranks of instructor, assistant professor, associate professor and professor.

The model -- a pattern of correlations indicating the professional behavior of the faculty as a whole -- is based upon a dichotomous division of the professional behaviors listed above.[5] The one class of guild behaviors consists of those which primarily depend upon the judgment of other members of the

TABLE NO. 1

COMPARATIVE DISTRIBUTION OF PERCENTAGES OF THE CHICAGO CITY JUNIOR COLLEGE FACULTY'S HIGHEST EARNED DEGREES WITH TWO RECENT STUDIES

HIGHEST EARNED DEGREES	COUNELIS CCJC STUDY 1962[a]	MEDSKER JC STUDY 1960[b]	EELLS STUDY: 1954[c]		
			2 YR. COLLEGE	4 YR. COLLEGE	ALL ACCRED. COLLEGES
DOCTORATES	15.00	9.60	8.70	38.70	35.90
MASTERS	82.00[d]	64.60	54.50	38.90	40.40
BACHELORS	3.00	17.00	22.40	11.80	12.80
PROFESSIONAL	--[e]	--	--	8.50	7.70
INDETERMINATE	--	2.10	--	--	--
NONE	--	6.70	14.40	2.10	3.20
Σ	100.00	100.00	100.00	100.00	100.00

[a] James Steve Counelis, *The College Faculty: A Description* (Chicago: The Chicago City Junior College - Woodrow Wilson Branch, 1963), pp. 6-8.

[b] Leland L. Medsker, *The Junior College: Progress and Prospect* (New York: McGraw-Hill Book Company, Inc., 1960), p. 172.

[c] Walter Crosby Eells, "Highest Earned Degrees of Faculty Members in Institutions of Higher Education in the United States, 1954-1955," *College and University*, Vol. XXXIV, No. 1(Fall, 1958), p. 12.

[d] Of the CCJC faculty, 31% have an earned master's degree with 36 sem. hrs. of graduate work or more beyond that degree; while, 51% of the CCJC faculty have an earned master's degree with less than 35 sem. hrs. of graduate work beyond that degree.

[e] In the Counelis CCJC study, the first professional degrees, *viz.*, J.D., M.D., D.B., M.B.A., were coded statistically as master's degrees because that is their assigned academic value with the policies of the Board of Examiners of the Chicago Board of Education and the Chicago City Junior College.

guild. To this class belong the publishing of books and journal articles which require the judgment of others prior to publication. Also, the judgment of the academy is involved in the bestowal of academic awards.

The second class of professional behaviors is composed of those which are primarily characterized by the individual initiative of the professional. Memberships in professional organizations, professional activities with reference to guild government and scholarship, public service, and self-improvement belong to this group.

There is a seventh factor not accounted for in these two categories. This factor is the number of years in college teaching per faculty member. This is a factor that qualitatively is neutral, though it does presuppose that age and experience go hand-in-hand. With the model, this experience factor separates the two classes of correlations described above.

The behavioral model of the college faculty is presented in a table, Table No. 2. In the original study from which this paper is extracted, the Pearson correlations were drawn as indicial bars, graphically displaying the relative direction and magnitude of the correlations between the professorial ranks and the seven indicia of professional behavior. Here, Table No. 2 displays the vertical pattern of each rank cutting the seven professional behaviors and the horizontal pattern of the several professional behaviors cutting across the academic ranks. It is to be noted that the factor of college teaching, cited for being qualitatively neutral, is placed as the fourth and separating factor between the two differentiated classes of professional behaviors given above.

The significance of this behavioral model of a college faculty lies not in the absolute values of the correlations obtained, but rather in the relative direction and magnitude of the correlations when they are interpreted in relation to their assigned place within the model.

Quite simply, the issue of direction refers to the positive and negative values of the correlations. The meaning of these signed correlations within the model is specific. A positive value warrants the observation that the professional behavior factor is, typically, to be found within a given professorial rank. A negative value warrants the observation that the professional behavior factor is not, typically, to be found within a given professorial rank.

The issue of relative magnitudes of correlations in this behavioral model is quite another problem. This problem has two parts: (1) the comparison of correlation sizes of all professional behavioral factors within the given classes of professorial ranks, each rank taken separately; (2) the comparison of correlation sizes of each professional behavioral factor taken singly for all of the professorial groups. For either part of this problem, the relative magnitudes of the correlations indicate preferential ordering of the professional behaviors within the value structure of the college faculty as a guild. This preferential ordering of professional behaviors certainly documents the typical behaviors of college professors.

TABLE NO. 2

A BEHAVIORAL MODEL OF THE COLLEGE FACULTY: PEARSON CORRELATIONS BETWEEN PROFESSORIAL RANKS AND THE GUILD BEHAVIORS OF THE PROFESSORIATE

PROFESSORIATE GUILD BEHAVIORS	PROFESSORIAL RANKS			
	INSTRUCTORS	ASSISTANT PROFESSORS	ASSOCIATE PROFESSORS	PROFESSORS
A	-.220	.006	.346	.119
B	-.207	-.003	.302	.237
C	-.118	.016	.064	.214
D	-.449	.242	.388	.300
E	-.265	.196	.221	.031
F	-.234	.164	.146	.068
G	.152	-.156	.010	-.008

A. Number of Books Published / Faculty Member

B. Number of Journal Articles Published / Faculty Member

C. Number of Academic Awards / Faculty Member

D. Number of Years of College Teaching / Faculty Member

E. Number of Professional Organization Memberships / Faculty Member

F. Number of Professional Activities / Faculty Member

G. Academic Improvement: Yes or No / Faculty Member

For the rank of instructor, Table No. 2 presents the data which graphically demonstrates that there is only one professorial behavior which is correlated positively with this academic rank. This factor is academic improvement, yes or no, within the last five years. There is no doubt that the junior academic member of the faculty, as a novice, is concerned, mainly, with academic preparation and professional improvement. All other professional indicia are absent, for they are found to be negatively correlated with the rank of instructor. Hence, these are not a part of the career cycle of the typical college professor's early career.

Table No. 2 presents the data for the rank of assistant professor. It is seen, readily, that the typical assistant professor tends to develop those aspects of his professional career which are the easiest to cultivate and which are, for the most part, within his own control. Professional organizational memberships and specific professional activities other than publication and research are developed at the expense of further professional preparation and improvement. This is evidenced by the negatively correlated factor of academic improvement and the positive correlation of professional organizational memberships and professional activities to this academic rank. Concomitantly, the years of experience increase. One notes the acquisition of a few academic awards with very little publishing activity developing. Certainly, the typical assistant professor is setting the foundation for professional development and advance in his career line.

Table No. 2 shows the associate professor is at the peak of activity for his entire professoriate. Partly on the backlog of work done during his assistant professorship days and partly on his current work time as associate professor, his publication rate for books and journal articles is at its highest. Significantly, more academic awards come his way. Though the number of professional organizational memberships tend to increase, his actual number of professional activities tends to decrease, probably to a more select group. A very small positive trend in academic improvement is evident also. Whether with or without tenure, the associate professor is probably the most productive faculty person, if actual classroom teaching is not omitted. He is on the way up.

The behavioral profile of the professor is given in Table No. 2 also. The professor is the comfortable, tenured, elder statesman of the academic guild -- a specific faculty. He reduces, numerically, his professional organizational memberships to a few choice ones which he values or needs professionally. Further, he reduces considerably specific professional service to those which he can do, probably to those activities which are high in prestige and, perhaps, light in service. There is a marked reduction in publication activities, books more than journal articles. But his academic awards increase greatly. He is reaping the rewards of academe, be they for past service, former scholarship, and/or admired virtues.

Within Table No. 2, one can discern the natural history of the college professor. This career cycle is reflected in the class behaviors which typify each academic rank, taken in hierarchical order. This discernible sequencing of academic ranks is a function of time. The pattern of behaviors for each professorial rank does describe, in a collective way, the typical college professor in each rank, through time. Hence, the type, or image, or icon for each professorial rank is defined. When the four academic ranks are viewed in an ordinal sequence of time, the career cycle is, therefore, brought into high relief.

The holistic description of a college faculty, as the model herein presents, is an empirical embodiment of a conception as to what a faculty is. No doubt, some may quarrel with the notion that a faculty is a guild. Most assurdly, the teaching function is not given a qualitative character and place within this behavioral model of a college faculty. And yet, these limiting aspects do not vitiate in any substantive manner the theoretical strength and heuristic value of the guild notion in describing the nature of a college faculty in this total manner.

II

There are two points on methodology to be presented here. The first is the presentation of a notion of what a "conceptual framework for institutional research" is. The second issue is to cite the relationship of this notion to methodology.

With interest and surprise, I read the 1964 NIRF volume A Conceptual Framework for Institutional Research. I found, unexpectedly, that this whole document seemed to be a group exercise in justifying a professional role for institutional researchers within higher education. I suppose that this is to be expected for those who are "underdogs" and that avant garde in any profession.

But moreso, I was struck by the "evolving" notion of "a conceptual framework for institutional research" found in the papers of Baskin, Grout and Hubbard[6] and in the general organization of the whole volume. In general, all of these papers were rooted, fundamentally, within the administrative order of particular institutions of higher education. The "frame of reference" of "conceptual framework" was taken to be the professional role of the investigator within the institution. It was this assumption that took me by surprise.

In no basic way are the processes of inquiry in institutional research unique or are the problems posed by college and university administration peculiar to these institutions. Nor are the issues of competing values, loyalties and priorities any different from those found in other institutional arrangements. Nor does the role of the institutional researcher in any type of organization determine and define the conceptual framework for his intellectual processes that produce the results of his inquiry. Thus, I must ask, "What, if any, is the conceptual framework of institutional research?"

The belief expressed here is that "the conceptual framework of institutional research" is the recognition and conversion of all institutional research problems into "theoretical" form. The term "theoretical" is used here in the sense of knowledge about what the case is.[7] This Aristotelian notion of knowledge is distinguished from other kinds of knowledge, such as those which stem from the questions "how?" and "ought?." This does not preclude the development of research techniques or evaluational practices required in institutional operation. But this orientation does alter their meaning and use.

Within this understanding, institutional research has a double aspect of all sciences, be they humanistic or any other kind. Science is both an intellective process of inquiry and an organized body of propositional statements about any object. Some confusion of these aspects is evident in institutional research writing. Institutional research reports, as sets of warrantable assertions about some institutional object, are science. Institutional research reports, as the investigators' reconstructed intellective process of inquiry, are examples of scientific methodology.

It is the opinion of this writer that the conception and resolution of institutional research problems ought to be (nay, needs to be) at a sufficiently high level of generality so that the uniqueness of the institution does not obscure the most comprehensive and informative principles possible when attained through the most rigorously precise data attainable. If institutional research is to have relevance and impact for higher education, the specific institutional object studied must become the Hegelian concrete-general.[9] It is in this sense that this writer's topic, "The Holistic Description of a College Faculty," has a broader meaning than that applied to the specific junior college studied.

Traditionally, the writers on scientific method have been logicians, practicing scientists in philosophical mood, and statisticians. Philosophers of science and statisticians are in current ascendancy. In the university curricula, statisticians in various guises have tended to usurp methodological courses, and statisticians are training more people in their method than do the philosophers of science and others in the humanistic disciplines.

This writer believes, however, that current statistical method is not the whole of scientific methodology. The former is a subsumable part of the later. A comprehensive theoretical conception of scientific methodology is possible. But is is also true that such a theoretical concept of method is not a completely developed one at this time. Philosophers of science are working on various phases of it currently.

The theoretical idea of scientific method conceived by this writer is not to be confused with the pragmatic reflections of this methodological theory. It is the pragmatic level of scientific methodology upon which practicing scientists and statisticians generally muse. This writer conceives scientific methodology as having a higher level of generality and comprehensiveness. Theoretical scientific methodology would be applicable to all sciences, regardless of datal, formal, and axiological qualities.

Theoretical scientific methodology is conceived by this writer to have four theoretical and ordinalized sub-elements. The first part is the theory of intellective action. This part of theoretical scientific methodology is concerned with the definition and description of problem constructions, problem resolutions, and their interrelationships. The basic questions are: "What is a problem?": "What is a problem's resolution?"; and "What are the connective elements between problem and resolution?".[10]

SCHEMA NO. 1

SCIENCE AS PROCESS AND PRODUCT

ARISTOTELIAN COMPONENTS		COMPONENTS OF SCIENTIFIC METHODOLOGY AND THEIR DERIVATIVE ELEMENTS IN SCIENCE			
SCIENCE AS		EFFICIENT CAUSE	FINAL CAUSE	MATERIAL CAUSE	FORMAL CAUSE
SCIENTIFIC METHODOLOGY	THEORY	Theory of Intellective Action	Theory of Axiology	Theory of Ontology	Theory of Forms
	PRACTICE	The specific problem construction	Values: specific problem goals and actional strategies	The specific nature and orders of data	Appropriate logic, statistics, mathematics, and language
HYPOTHETICAL DIRECTION OF METHOD		↓	↓	↓	↓ →
SCIENCE	PRODUCT	The specific problem resolution	Values: achieved goals and ordered actions employed	Specific processed data employed	Specific propositional forms on the nature of the case employed
HYPOTHETICAL ANALYSIS OF SCIENCE		←			

The theory of axiology is the second sub-element of theoretical methodology. This part is concerned with values. In the resolution of researchable problems, teleological, ordinal and datal values are always present. These valuational aspects need to be generalized at the highest level. At the practical level, these valuational issues have been subsumed in formal design theory.[11]

All science is based upon data. The theory of ontology is concerned with that part of theoretical methodology wherein the nature and order of all data are described, defined, classified, and explicated in qualitative and quantitative terms.[12] Certainly, the comprehensive rigor of this sub-element of scientific methodology is of great importance because datal character determines, in large part, the successful outcome of a given resolution for a specific problem.

The fourth and last part of theoretical scientific methodology has as its burden the structural aspects of datal response to the question being answered. This structural aspect is called the theory of forms. Certainly at the pragmatic level, logic, statistics, mathematics and language are forms. However, the theory of forms is involved with a more comprehensive view of tectonic ordering of data than the individual practices found in the formal studies listed above.[13]

Science, conceived as process, is here defined to be scientific methodology at both the theoretical and practical levels. Science as process is read, hypothetically, from the theory of intellective action through the theory of axiology and the theory of ontology on to the theory of forms. To be sure, this processual order is a reconstructed logic because human minds do not by nature think logically but associatively. It is by training and refined study that logic becomes the equipment of scientists. Hence, the term "reconstructed."[14]

Each of the processual sub-elements in theoretical and practical scientific methodology infer separable elements in science when science is construed to be a product. But when the elements are structured intellectually, the whole notion of science as product is exemplified. The hypothetical analysis of science as a product provides for the reading of the inferred elements in the reverse order of the processual sub-elements of scientific methodology. Hence, specific propositional forms on the nature of the case contain within themselves specific processed data which are garnered by serialized actions in order to achieve the goals of the original problem and provide, therefore, a total resolution. Schema No. 1 provides a visual comprehensive diagram which describes science as process and product.

Institutional researchers have, indeed, a real opportunity and a unique position to develop the theoretical level of scientific methodology through their behavioral science data. It is the hope of this writer that institutional researchers will lead the field in producing a body of fundamental behavioral data and a firm theoretical basis for scientific methodology. For out of the Hegelian concrete-general can come fundamental science as principle, fact and method. Through such fundamental research, higher education will profit, moving from the quicksands of artful intuition to the more trusted firmament of knowledge and rational action.

FOOTNOTES

[1] James Steve Counelis, The College Faculty: A Description (Mimeographed Booklet; Chicago: The Chicago City Junior College - Woodrow Wilson Branch, 1963).

[2] The City of Chicago (Ill.), Board of Education, Board Report No. 70613: To Approve Academic Ranking of Chicago City Junior College Faculty, August 8, 1962.

[3] Counelis, College Faculty, op. cit., pp. 7-17.

[4] For the guild notion used here, see, James Steve Counelis, American Government, Higher Education and the Bar (Ph.D. dissertation; Chicago: The University of Chicago, 1961), pp. 6-12.

[5] These correlations are Pearson r's. The 1620 Correlation Program/Card, No. 6.0.089 of the 1620 USERS GROUP was used. Mr. Paul Paschke, then in the Bureau of Data Processing of the Chicago Board of Education, programmed the original project from which this paper is drawn. Mr. Paschke is now at Oregon State University, Corvallis, Oregon.

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Explicit criteria warranted for evaluation of executive administrator behavior need to be identified for public higher education. Recognition of this problem led to an investigation of its scope and to this study which analyzes judgments of criteria suggested for executive administrative behavior evaluation.

Little attention has been shown in the past to systematic research studies on the administration of higher education. To be sure, there is a wealth of literature on this area based primarily on the experience of administrators and scholars in higher education. The listing of these significant publications by Eels and Hollis[1] indicated a number which bear on the administration of higher education, including doctoral dissertations. These scholarly works, however, are not research studies in the evaluation of criteria of administrative behavior in higher education. Burns,[2] Henderson,[3] and Wilson,[4] as well as others, have all written to cite the lack of research centered directly on the behavior of administrators in higher education. The need for a systematic study of the relationships in the administration of higher education centers in an understanding and definition of administrative behavior.

Complexity of Administrative Structure

The number of institutions of higher education in the United States today exceeds 2,000[5], with an enrollment exceeding 4,200,000 students.[6] The continued growth in terms of numbers of institutions and students enrolled present realistic problems to institutions of higher learning in terms of the administrative staff which must plan, organize, staff, operate, budget and evaluate academic programs.

Colleges and universities faced with increasing enrollments and expanding numbers of programs of instruction have found themselves of necessity focusing an increased interest on the administrative structure and organization of the enterprise which must be successfully carried on to meet effectively this challenge.

Obtaining the necessary finances and providing adequate budgets for the educational enterprise represent skillful and serious minded work. All these activities, increasing in intensity, complexity, and scope, represent in some way the growth of the three great functions of institutions of higher education: teaching, research and service. The fruition of the objectives of these functions has tended to increase the attention focused on the importance of effective administrative behavior in the direction of institutions.

Russell[7], Mooney[8], and others have demonstrated that executive administration of higher education has changed considerably in the last 75 years. That it will change in the future and faces rapid immediate expansion is indicated by Glaze.[9]

The future is considerably more challenging in terms of the complexity of administrative structure and procedures for public institutions than it is for private insitutions of higher education. Tickton in reporting to the Association of American Colleges in 1963 on research done for colleges and universities in relation to their need of future plans found that while total enrollments in institutions of higher education are expected to increase by more than 300% from 1960 to 1985, the heavy portion of this increase will occur in public universities.[10] Tickton also reported that in 1960 42% of the enrollment in higher education was in private institutions, whereas by 1985 only 20% of the total enrollment will be in private institutions. Thus, where public institutions of higher education cared for 58% of the total enrollments in 1960, they will be expected to care for 80% in 1985.[11]

More is being demanded of the administrative staff in the way of service for the academic program of the college or university and of formalized preparations for the administrative positions in colleges and universities. As responsibility in terms of scope of operation and the effectiveness which must be present in the performance of the administrative duties has increased, the necessity for appropriate criteria by which the administrative performance of these college executives can be evaluated adequately has become more urgent.

Evaluative Criteria

An essential administrative problem is effective performance of executive administrators. Before effectiveness of performance can be evaluated adequately, performance criteria for the analysis and evaluation of effectiveness need to be identified. Corson points to this as he indicates:

> In short, the administrator's task in the university is made infinitely more difficult than the task of his counterpart in business or in government not only by the lack of built-in means of appraisal but by the complexity of developing such measures.[12]

Recent research has identified functions and responsibilities of executive-administrative officers helpful to the executive administrative community.[13] However, definition of administrative function and responsibility needs identification of behavior criteria for support and implementation.

It appears, however, that an appraisal of criteria for evaluating administrative performance is yet to be accomplished. Certainly evaluation of administrators in higher education takes place. Some individuals find themselves appointed to positions, others are asked to resign, and some receive increases in salary. Additional members of the academic community are considered for advancement in administrative positions. All of these activities represent the result of evaluation. Though evaluation of this type is representative of judgments of the success or lack of success an individual has experienced in the performance of his duties, such evaluation is not completely descriptive and lucid as to the criteria which have been taken into account in making the evaluation.

Complicating the difficulty of a lack of agreement concerning the criteria to be applied by the academic community is the fact that evaluation of administrators in higher education is carried on by several different and important publics. Evaluation takes place by trustees of universities,[14] students, faculty, fellow administrators, general public, alumni, and the state legislators. It is continuous whether or not it is wanted. The administrator is perhaps less protected from the consequences of such evaluation than is his colleague of the faculty whose activity in the classroom or research lab is by its nature subject to evaluation by students and his fellow faculty members only.

The criteria utilized in making evaluations of administrators may or may not be appropriate, further complicating the process.

Though such a study would be of interest to the researcher in any academic climate, it is of special interest to institutions which face rapid increases in administrative organization, resulting from their attempts to meet the challenge of educating with excellence greater numbers of students, the carrying on of a greater scope of research activities and a wider area of community service.

Definition of Administrators

It is necessary to think of academicians in higher education as executive administrators. It is recognized that such terms as executive and executive administration are to some extent alien to the concepts and climates of institutions of higher education. Writings of Cattell[15] and those of Lindsay and Holland,[16] representing thoughts of a half century and thirty-five years ago, clearly show that differences which exist between functions of the executive administrator and academicians in university operations have been considered for the last half century.[17]

The matter of identifying persons who are at the chief policy-making decision level of the university has been done, and this inquiry took on the definition of these persons for the purposes of the study. Hollis has indicated that administrative organizations in the institutions of higher education should:

> Divide the administrative responsibilities into four groups--education, fiscal, student affairs, and public relations, and should place each group under the jurisdiction of an officer directly responsible to the president, as an essential step for effective and economical administration on the campus.[18]

Martorana,[19] Russell,[20] Corson,[21] and Dodds[22] all support the contention that the central decision making body of complex institutions can be represented as the executive administrative group of the insitutions. These authors and others have defined what constitutes the executive group in higher education. Traditionally, this has been chiefly the president's office of the institution, but more recently the executive administrative operation of a college or university has been conceived as a team operation of executive administrators. Glaze supports this contention as he says:

> The concept of management of a university is that of a team. The team is composed of a governing board, the president, the vice presidents, deans and any other major administrative officers.[23]

Thus, the executive administrators were defined as those members of the chief management team of an institution charged with the responsibility of major administrative policy decisions. These executive administrators were identified as members of the board of trustees, the presidents and the vice presidents for academic affairs, business affairs, student affairs and public relations development. The study centered on identifying criteria which are warranted in the evaluation of the administrative behavior of these executives. The issue at stake was that if effective performance is increasingly to be desired and of sharpened necessity in periods of rapid expansion of institutions, then it is paramount to attempt some identification of criteria by which such performance may be evaluated.

The Hypotheses of the Study

The following hypotheses were developed in order that the investigation could be accomplished.

(1) There are criteria of administrative behavior common to the administrative performance of executive administrators in institutions of higher education which can be identified as warranted for the evaluation of such performance.

(2) There is no significant difference in the judgments within the defined executive administrator groups of the study regarding the importance of these criteria for the purpose of executive administrator evaluation in public higher education.

(3) There is no significant difference in the judgment among the executive administrator groups of the study, regarding the importance of these criteria for executive-administrator evaluation.

(4) There is no significant relationships in the judgments among the defined executive administrator groups of the study regarding the order of importance of these evaluative criteria of executive-administrator performance.

(5) There is no significant rank order relationship in the judgments among the defined executive administrator groups of the study regarding the order of importance of the major administrative behavioral categories for the evaluation of executive administrator performance.

(6) There is no significant relationship in the judgments of the responding groups concerning the weight of importance of each of the criteria for the evaluation of each of the executive administrator positions in public higher education.

The one percent level of confidence appeared appropriate for the purposes of testing the hypotheses.

Identification of Selected Criteria

The hypotheses required identification of criteria of administrative behavior to be judged. These criteria were identified from the field of management since such criteria in precise form are absent in research dealing with executive administrative behavior in higher education. To be sure, there is literature which deals obliquely with this area of study, but there is little in the literature of higher education which identifies the individual behavioral act in the administrative situation.

The matrix criteria of administrative behavior chosen for the study were selected from portions of the writings of Carl Heyel.[24] In addition, certain criteria dealing with academic scholarship, experience, orientation, and behavior of the executive administrator were added. The items on scholarship-experience were included to offer some possibility that administrative behavior criteria for the executive in higher education might be identified as unique in operation from that of the usual executive in management.

The major administrative behavior criteria categories identified from the matrix of administrative behavior criteria were long range planning, ability to make decisions, ability to delegate and assign, ability to check up and follow up, ability to coordinate and direct, interpersonal effectiveness, academic scholarship experience orientation,* development of staff, and *ability to plan current operations. These were accepted with minor word order* changes as they appeared in Heyel's descriptions.[25]

An example of the administrative behavioral act which the respondent was asked to judge for importance is indicated below.

Having an organizational plan for projected responsibility of the office.

	IMPORTANCE				
	CRITICAL	REASON-ABLE	SOME	LITTLE	NO
The President	☐	☐	☐	☐	☐
Vice Pres. Academic Affairs	☐	☐	☐	☐	☐
Vice Pres. Bus. Affairs	☐	☐	☐	☐	☐
Vice Pres. Student Affairs	☐	☐	☐	☐	☐
Vice Pres. Dev.-Pub. Rel.	☐	☐	☐	☐	☐

Statistical analyses used for the study were rank order correlation to test the significance of the weighted importance established for the criteria of administrative behavior in the study by the separate respondent groups of the presidents, vice presidents, and the trustees.[26] Additionally, a simple analysis of variance was used for the testing of the significance of difference within a respondent group regarding the importance of each criterion for each of the executive administrative positions in the study.[27] A multiple analysis of variance was used to study the significance of differences between the respondent groups regarding the importance of each criterion for each of the positions being studied.[28] Kramer's Extension of Multiple Range Tests to Group Means with Unequal Numbers of Replications was used to test the possible significance of any difference disclosed by the multiple analysis of variance.[29]

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*Indicates author's addition

The use of the Pearson Product-Moment Correlation was made to test the character of the linear relationships assumed to exist between the judgments of the respondent's weighting of a criterion for his own position and his weighting of the criterion for another position.[30]

Additionally, interviews on selected campuses were held with presidents and executive administrative staff members reporting to presidents for the areas defined in the study. The purpose of these interviews was to follow up the perceptions of the study, to enlarge on findings appearing in the study, and to gain further understanding and insight into the criteria appropriate for executive administrators in institutions of higher education, particularly as such criteria are related to the evaluation of administrative behavior.

The data of the study were returned and coded into a punch card system, suitable for processing in an IBM 1620 computer.

The study was now pointed in a specific direction of ascertaining warranted behavioral acts related directly to executive performance in public higher education.

Findings of the Study

The testing of the data by various statistical procedures resulted in discrete findings. The data were tested with a wide range of analytical procedures and explored in depth on each point bearing on the hypotheses.

The major findings related to the hypotheses are:

(1) All eighty-four criteria of administrative behavior listed in the research instrument were judged to be of importance for the possible evaluation of executive administrator performance in public higher education.

(2) There was found to be significant agreement within each responding group concerning the importance of each criterion for evaluation.

(3) A significant variation of response was shown to exist between the responding groups in their judgments of the importance of sixty-three of the criteria.

(4) All possible rank order correlation relationships between the responding groups concerning the order of importance established by each group for the criteria were shown to be significant.

(5) Significant positive relationships were found among 14 of the 21 possibilities between the groups in their judgments of the importance of major administrative behavior categories.

(6) Positive relationships with high significance were found in the responses of groups indicating how each group saw each criterion applying to its own office in comparison to how each group saw the same criterion applying to each of the other groups.

Table I and Table II indicate the rank established for each of the major executive behavior categories by each responding group and the resulting rank correlation coefficient.

Findings from the Interviews

Perceptions gained from the interviews tended to support the statistical findings of the study. There appears to be a tendency to construct more formalized procedures for the evaluation of administrative performance than has been true in the past. This results from the necessity growing out of the increased size and complexity of administrative staffs. Of utmost importance in any matrix of criteria to be applied in such formalized procedures was the ability to plan far ahead for the accomplishment of institutional goals and the importance of consistently arriving at effective decisions while being sharply aware of inter-personal relationships with colleagues.

The persons interviewed were not in agreement that there can be a complete transferability of administrative skill from management positions outside higher education to this field. Numbers of persons interviewed indicated that anyone moving from management positions in industry, business or the military or government to comparable positions in higher education would need to serve a reasonable apprenticeship in higher education before he could expect to be totally effective in his new position.

There appears to be a reasonable consensus among the administrators interviewed that management of an institution, particularly as it increases in administrative structure, is a team effort, but the total effectiveness of the management effort will be measured in terms of how deftly the chief executive can avoid the administrative climate which lets it be known either by practice or formal communication that the major administrative decisions are made by the administrators closest to the chief executive without extensive consultation with other areas of the institution concerned with or affected by the decisions.

Conclusions of the Study

Eighty-four criteria of administrative behavior chosen from authoritative management literature have been established as warranted for the evaluation of executive administrator behavior in public higher education. The warrantability of each of the criteria has been established for presidents, vice presidents of academic affairs, business affairs, student affairs, and public relations-development. Such warrantability derives from judgments of experienced persons currently holding these positions in selected institutions of public higher education. Those positions have been also identified as a management team for a university and further described as executive administrators.

Responding groups were agreed that each criterion was as warranted for evaluation purposes in the case of its own office as it was for the other executive administrator offices.

Interviews with seventeen executive administrators from the study supported the statistical findings. Further discoveries indicate a necessity to make decisions, to be keenly aware of inter-personal relationships, and to

MAJOR CATEGORY OF ADMINISTRATIVE BEHAVIOR
BY
RANK WITHIN GROUPS OF RESPONDENTS

TABLE I

Major Categories	Rank Pres	Rank VPAA	Rank VPBA	Rank VPSA	Rank VPPubRel-Dev	Rank Trustees	Rank All
1-Long Range Planning	2	2	3	1	1	1	1
2-Abil. to Make Decisions	1	1	6	3	3	2	2
3-Abil. to Deleg. & Assign	5	5	2	6	4	4	5
4-Abil. to Check Up & Fol. Up	9	7	8	9	8	9	9
5-Abil. to Coordin. & Direct	6	6	1	7	5	7	6
6-Interpersonal Effect.	3	3	5	4	2	5	3
7-Acad. Scholar. Exper. Orient.	7	9	9	8	9	8	8
8-Devel. of Staff	8	8	7	5	7	6	7
9-Abil. to Plan Curr. Operations	4	4	4	2	6	3	4

TABLE II

Groups	Rank Correlation Coefficient
President & VP Academic Affairs	.933
President & VP Bus. Affairs	.416
President & VP Student Affairs	.816
President & VP Public Rel.-Development	.850
President & Trustees	.883
President & All Groups	.966
V.P.-Academic Affairs & Bus. Affairs	.450
V.P.-Academic Affairs & Student Affairs	.783
V.P.-Academic Affairs & Public Rel.-Dev.	.883
V.P.-Academic Affairs & Trustees	.850
V.P.-Academic Affairs & All Groups	.933
V.P.-Business Affairs & Student Affairs	.366
V.P.-Business Affairs & Public Rel.-Dev.	.616
V.P.-Business Affairs & Trustees	.466
V.P.-Business Affairs & All Groups	.500
V.P.-Student Affairs & Public Rel.-Dev.	.710
V.P.-Student Affairs & Trustees	.933
V.P.-Student Affairs & All Groups	.900
V.P.-Public Relations-Dev. & Trustees	.783
V.P.-Public Relations-Dev.& All Groups	.916
Trustees & All Groups	.933

N=9
Degrees of freedom = 8
Value of Rho
necessary to reject the hypothesis: .767
at the 1% Level.

demonstrate success in planning. These along with the ability to delegate and assign were identified in the interviews as those qualities of utmost importance in administrative behavior.

Comment concerning the importance of scholarship activity indicates that while scholarly activity is much to be desired on the part of the administrator, it is most difficult to achieve because of the instrinsic qualities of such activity being vastly different from those of administration. Scholarly activity was characterized as needing time, isolation from intervening affairs, and freedom to sustain a singleness of attention. Administration at the executive level was found to operate in an atmosphere of swiftly changing events in which priorities of attention change with needs to generate policy decisions without unnecessary delay. A realistic view of present executive administration in public higher education disclosed that scholarly endeavor is made most difficult by the demands of administration. This realization places a heavy responsibility on the management team of a university to be constantly aware of the academic enterprise it serves, even though the individual members of the team may not be consistently engaged in classical academic endeavor.

Suggestions for Further Research

This study has provided a fruitful area for further research activity, while at the same time making available to one institution valuable insights into administrative behavior and the warrantability of certain criteria which might be usable in evaluation procedures.

The claim of the study is limited to the research area in which it worked. However, it suggests inquiries into the following:

1. How would the criteria evaluated in this study be evaluated by executive administrators of private colleges?

2. What relationship do these criteria have to the demonstrated image of successful and unsuccessful executive administrators in higher education?

3. What weight of importance would be given these criteria by the academicians of higher education?

4. What special areas of knowledge can be identified as requisites to produce the kinds of administrative behavior which have been identified in this study as warranted for evaluation?

5. Which of these criteria can be identified as educational goals of present programs of higher education designed to provide future executive administrators?

Accomplishment of the research suggested above will assist in future validation of criteria for the evaluation of executive administrator performance in higher eudcation.

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PART III

CONTRIBUTED PAPERS ON MODELS AND METHODS

Methods for Future Enrollment Estimation Under Trimester Calendar

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State University of New York at Binghamton

Methodology for Planning

Vernon C. Mickelson
Director of Institute Planning
Case Institute of Technology

Mathematical Models of Space Utilization

Donovan Smith
Specialist in Physical Planning
Analytical Studies Office
University of California

The Methodological Complex

Irma T. Halfter, Director
University Testing and Evaluations
DePauw University
and
Edward M. Stout, Registrar
DePauw University

Using a Matrix of Coefficients as a Planning Tool

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H. R. KELLS
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The process of future enrollment estimation has been complicated considerably by the introduction of the year-round calendar. Under the traditional semester calendar the designated or determined values of certain variables such as attrition rates, transfer student expectations, campus capacity, desired rate of growth, and other factors could be simply and effectively applied to produce enrollment projections by class level for specific future semesters with a high degree of accuracy. However, the year-round calendar per se is not the major complicating factor. The specific form and particular characteristics of the system such as the number of admission dates per year and the degree of freedom afforded the student in the choice of enrollment pattern are the sources of frustration to the campus official who must indulge in numerical prestidigitation for the benefit of the campus planners, budget officer and other officials of the college.

Under year-round education a new terminology emerges and some familiar concepts take on new importance. The campus administrative staff must adjust existing methods to meet the demands imposed by the new calendar and possibly, as at our institution, a new enrollment scheme. Terms such as the student academic year, enrollment pattern, and acceleration are important concepts that all campus officials must understand. It is confusing at first to discard the familiar designation of "the class of 19__" in favor of "the entering class of the __________ semester." It is even harder to adjust to the fact that students of all eight semester levels are present on campus each semester. Although there are many facets of the traditional campus experience which are affected by the introduction of year-round education, this paper will be restricted to the area of future enrollment estimation.

I would like to describe the work we are doing to develop a reliable method for the prediction of future enrollment under our particular type of system. Hopefully, the enrollments of the method are defined well enough to be of application in other situations. Since the characteristics of our form of year-round education are challenging, if not extreme, the description of our efforts may be of general interest.

The examples and studies described refer to Harpur College, the undergraduate element of the State University of New York at Binghamton. The year-round plan is the trimester with an academic calendar in which semesters begin in July, November, and March. New students are admitted each semester--so there are three entering classes a year. Students generally attend two of the three semesters in a calendar year; however, they have in effect complete freedom to attend or not attend any given semester. They may accelerate their program to shorten the total time required to complete the degree requirements or to switch to another enrollment pattern. They may decelerate, or they may remain in the normal (two on, one off) pattern. The choice of attendance pattern is, or course, affected by the availability of course offerings in a given semester, and patterns of attendance will undoubtedly shift as we approach the time when all three semesters are completely equivalent. We began the trimester operation in July 1963 and have had two years (six semesters) of experience under the plan. Some of the students who entered in September 1962 will graduate with a BA in June 1965, having been in attendance for eight straight semesters counting the two semesters which immediately preceded the July 1963 start under trimester.

Enrollment prediction under a system such as this which embodies multiple entrance dates and complete freedom of enrollment pattern requires the following and assuming a certain campus capacity, some knowledge of admission pressure for the entrance dates, and a certain rate of growth:

1. Student retention data
2. Transfer student data (desired or historical trend by semester level)
3. Enrollment pattern information

This appears to be straightforward, and indeed items 1 and 2 are. Figure 1 is a presentation of the type of retention study we are conducting for entering classes under trimester. Note that the quantities of interest in these data are the average retention and what we call the average "gross retention" of the original entering class at the semester indicated. In this form the data can be incorporated directly into the enrollment pattern information to be described shortly. The latter quantity incorporates with the retention data the transfer student experience by class level as the average percentage over the previous four semesters of the entering class size for those semester. Also note the lag in the data. One must wait until all segments (from various enrollment patterns) of the class achieve the level in question before calculating the retention at that leve. This may involve a two-three semester wait before all the patterns are expressed.

The key to successful enrollment prediction in this situation is in the application of an effective measure of the third item of necessary information--the enrollment pattern data; this is the difficult area. Some idea of the complexity is given in Figure 2 showing 128 possible enrollment pathways could be elected to complete eight semesters of work excluding all possible (and these are usable) pathways with two or more off semesters in a row. Students at Harpur generally do not take two off semesters in a row--although with very little paper work they may arrange to do this. In any event, the complexity of the situation does exist in what represents the regular enrollment patterns. The picture is further complicated by the odd pattern choices, transfer student patterns, and the overall change in pattern preference with time.

The overall plan chosen to evaluate and subsequently utilize this fairly complex information was one which may be described as having three phases.

Phase I (the "guesstimate" phase) - Until the time when usable information could be assembled from actual experience and indicated intentions, the enrollment pattern factors in the prediction process were little more than feelings or guesses. When this work was begun last summer, actual data was scarce. The first group of full accelerates was only four semesters along; normal (two on, one off) and other patterns were just beginning to be expressed. With this first minimal data and with a set of considered assumptions, estimations of the preferred enrollment patterns were made (see Figures 3 and 4)

FIGURE 1

Table of Retention Factors*

Semester	Entering Times 1956	1957	1958	1959	1960	1961	1962	Ju63	No63	Ma64	Ju64	No64
1 → 2	.829	.855	.942	.927	.955	.947	.962	.941	.953	.984	.951	
2 → 3	.794	.740	.800	.836	.884	.848	.868	.894	.937			
3 → 4	.786	.900	.895	.878	.943	.951	.981	.839				
4 → 5	.830	.924	.781	.791	.870	.800	.946					
5 → 6	.931	.927	.966	.912	.950	.975	.839					
6 → 7	.882	.941	.901	1.000	1.000	1.000						
7 → 8	.950	.958	.984	.961	.990	.965						

Average Retention* of Last 3 Classes for which Data is Available	
1 → 2	.963
2 → 3	.900
3 → 4	.924
4 → 5	.872
5 → 6	.921
6 → 7	1.000
7 → 8	.972

Average Retention* at Semester Indicated	
2	.96
3	.87
4	.80
5	.70
6	.63
7	.63
8	.61

Estimated Average "Gross Retention"** at Semester Indicated	
2	.97
3	.93
4	.91
5	.87
6	.82
7	.82
8	.80

*These are actual retention rates of students entering in the classes indicated only. Transfer students are not included.

**Actual retention plus transfers.

2

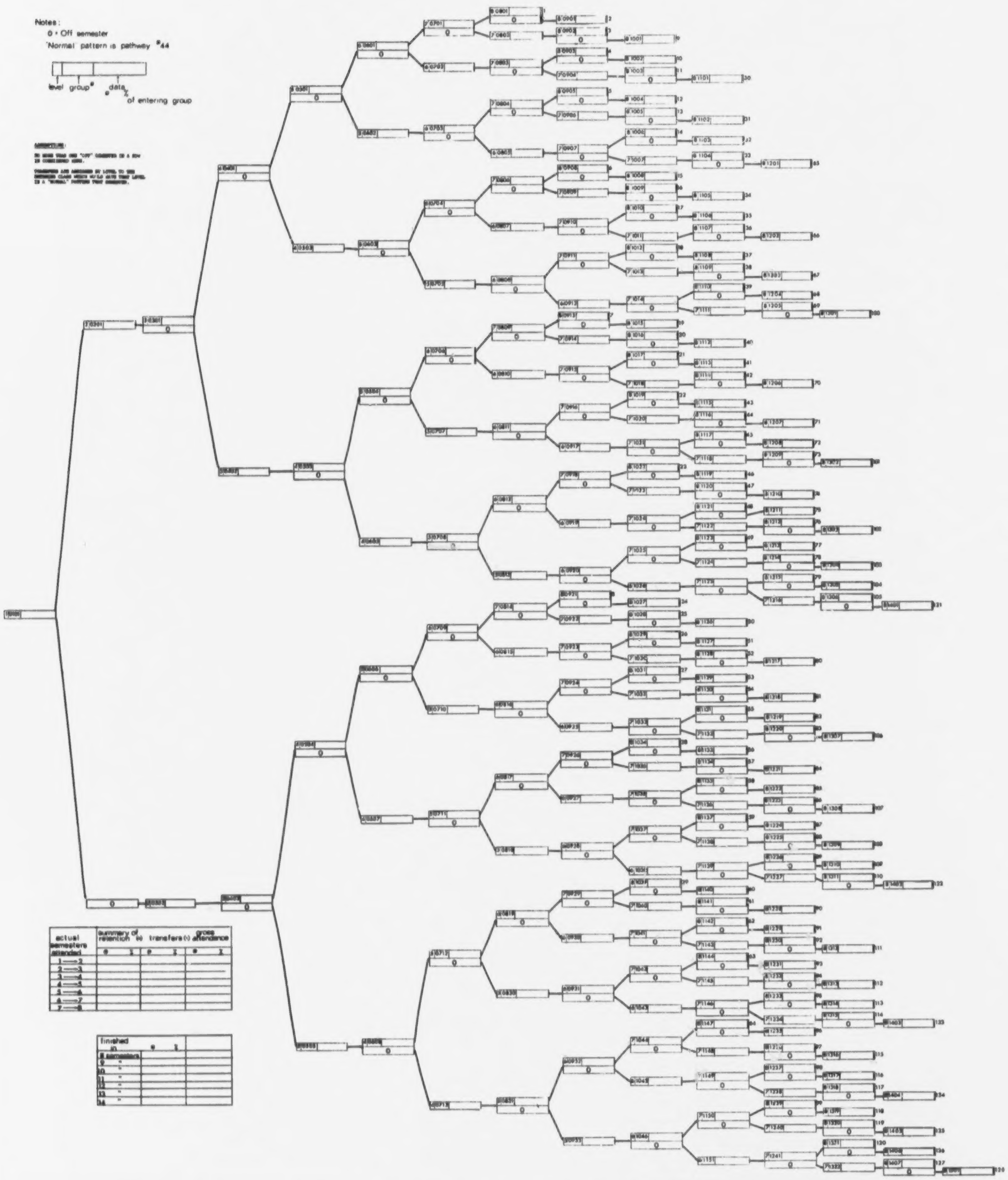
STATE UNIVERSITY OF NEW YORK AT BINGHAMTON
HARPUR COLLEGE
ENROLLMENT PATTERN
(undergraduate, full time, matric.)

Figure 2

class entering ______________

Notes:
0 = Off semester
"Normal" pattern is pathway #44

[illegible]



actual semesters attended	summary of retention (+) #	%	transfers (-) #	%	gross attendance #	%
1 ⟶ 2						
2 ⟶ 3						
3 ⟶ 4						
4 ⟶ 5						
5 ⟶ 6						
6 ⟶ 7						
7 ⟶ 8						

finished in	#	%	
8 semesters			
9 "			
10 "			
11 "			
12 "			
13 "			
14 "			

SEMESTER 1 # %	SEMESTER 2 # %	SEMESTER 3 # %	SEMESTER 4 # %	SEMESTER 5 # %	SEMESTER 6 # %	SEMESTER 7 # %	SEMESTER 8 # %	SEMESTER 9 # %	SEMESTER 10 # %	SEMESTER 11 # %	SEMESTER 12 # %	SEMESTER 13 # %	SEMESTER 14 # %	SEMESTER 15 # %
1:	2:	2:	3:	3:	4:	4:	5:	5:	6:	6:	7:	7:	8:	8:
		3:	4:	4:	5:	5:	6:	6:	7:	7:	8:	8:		
				5:	6:	6:	7:	7:	8:	8:				
						7:	8:	8:						
trans 1:	trans 2:		trans 3:	trans 4:		trans 5:	trans 6:		trans 7:	trans 8:				

FIGURE 3

Assumptions on Enrollment Pattern Preferences For Next Few Years

Assumptions:

1. Major goal is to finish in 11 total semester or less.
2. Strong desire to finish in June. (jobs, grad. school, asst'ships, etc.)
3. Off semester will be summer wherever possible (inertia, jobs, weather)
4. Winter-spring sequence will be the most attractive. (tradition, jobs, weather, inertia)

	Summer (July) Entering Classes	Estimated % of Students	Description	Total Time Span (Semesters)	Finish in (mo.)
	J N M J N M J N M J N				
A	1 2 3 4 5 6 7 8	12%	Full Acceleration	8	Feb.
B	1 2 3 X 4 5 6 7 8	45%	Go 2 extras, 1 summer off	9	June
C	1 2 3 X 4 5 X 6 7 8	20%	Go 1 extra--get on Nov-Mar	10	Oct.
D	1 2 3 X 4 5 X 6 7 X 8	10%	Switch to Nov-Mar sequence	11	Feb.
E	1 2 X 3 4 X 5 6 X 7 8	13%	"Normal Sequence"	11	Feb.
	Winter (Nov.) Entering Classes				
	N M J N M J N M J N M				
A	1 2 3 4 5 6 7 8	10%	Full Acceleration	8	June
B	1 2 X 3 4 5 6 7 8	10%	Go two summers	9	Oct.
C	1 2 X 3 4 X 5 6 7 8	10%	Go one summer	10	Feb.
D	1 2 X 3 4 X 5 6 X 7 8	70%	"Normal Sequence"	11	Feb.
	Spring (March) Entering Classes				
	M J N M J N M J N M J				
A	1 2 3 4 5 6 7 8	10%	Full Acceleration	8	Oct.
B	1 2 3 4 X 5 6 7 8	20%	Go 2 summers--go on Nov. Mar	9	Feb.
C	1 2 3 4 X 5 6 X 7 8	65%	Go 1 summer--go on Nov-Mar	10	June
D	1 2 X 3 4 X 5 6 X 7 8	5%	"Normal Sequence"	11	Oct.

X = off semester

FIGURE 4

Estimated Preferred Enrollment Patterns

Estimated Preferred Patterns	Estimated % of Students	1	2	3	4	5	6	7	8	9	10	11	12
						Connective Semesters							
						Pattern Descriptions							
July Entering Classes		July	Nov.	Mar.	July	Nov.	Mar.	July	Nov.	Mar.	July	Nov.	Mar.
July A	12	1	2	3	4	5	6	7	8				
July B	45	1	2	3	off	4	5	6	7	8			
July C	20	1	2	3	off	4	5	off	6	7	8		
July D	10	1	2	3	off	4	5	off	6	7	off	8	
July E	13	1	2	off	3	4	off	5	6	off	7	8	
Gross Enrollment factors* by semester		1=1.0	2=.97	3=.79	3=.12 4=.11	4=.80 5=.10	5=.61 6=.10	5=.11 6=.36 7=.09	6=.34 7=.35 8=.09	7=.23 8=.34	7=.10 8=.15	8=.18	
Nov. Entering Classes		Nov.	Mar.	July	Nov.	Mar.	July	Nov.	Mar.	July	Nov.	Mar.	July
Nov. A	10	1	2	3	4	5	6	7	8				
Nov. B	10	1	2	off	3	4	5	6	7	8			
Nov. C	10	1	2	off	3	4	off	5	6	7	8		
Nov. D	70	1	2	off	3	4	off	5	6	off	7	8	
Gross Enrollment factors* by semester		1=1.0	2=.97	3=.09	3=.82 4=.09	4=.82 5=.08	5=.08 6=.08	5=.66 6=.08 7=.08	6=.64 7=.08 8=.08	7=.08 8=.08	7=.55 8=.08	8=.53	
March Entering Classes		Mar.	July	Nov.	Mar.	July	Nov.	Mar.	July	Nov.	Mar.	July	Nov.
Mar. A	10	1	2	3	4	5	6	7	8				
Mar. B	20	1	2	3	4	off	5	6	7	8			
Mar. C	65	1	2	3	4	off	5	6	off	7	8		
Mar. D	5	1	2	off	3	4	off	5	6	off	7	8	
Gross Enrollment factors* by semester		1=1.0	2=.97	3=.86	3=.05 4=.86	4=.05 5=.08	5=.70 6=.08	5=.04 6=.68 7=.08	6=.04 7=.16 8=.08	7=.51 8=.15	7=.04 8=.49	8=.04	

*Gross retention by semester multiplied by estimated pattern preference.

and gross enrollment factors by semester calculated. These factors are the keystone of the method since they contain information about retention and transfer students as well as enrollment pattern preference. The gross enrollment factors calculated in the "guesstimate" phase of this work were employed to produce the enrollment forecast for Harpur dates 11-25-64 and presented as Figure 5. The figures presented in parentheses in the third column (Spring 1965) are the subsequent actual enrollment figures.

Phase II (the survey-preference phase) - As soon as it was possible to begin to collect information about the enrollment pattern intentions of the students from at least six entering classes (two at each entering time), a survey was conducted in which 96% of the student body participated (some 1700 students). The results were tabulated by machine, along with the record of the actual prior enrollment pattern for each student involved. The survey instrument employed and a condensed summary of some of the characteristics of the enrollment pattern distributions are presented in Figure 6. A combination of the enrollment pattern preference data for the six entering classes with the gross retention factors yielded the table of gross enrollment factors presented in Figure 7. These data which were calculated only last week will be employed this month to revise the undergraduate enrollment projections for Harpur.

Phase III (the true projection phase) - In about two years there will be enough actual enrollment pattern data compiled by entering class to have a broad enough information base from which to predict future enrollments. The principle of the gross enrollment factor should still be the major tool employed; however, these factors will be calculated from actual enrollment pattern experience rather than student intentions. Computer techniques will store and manipulate the actual pattern data. A program will be written for the computer which will not only permit automation of the projection process, but will allow enrollment simulation by which pattern, retention, or quantity of new students admitted can be varied at will and the resulting detailed enrollment picture presented in printed form in minutes. Work will begin on this system shortly.

(The valuable assistance of M. Coney, R. McCumber, G. Harvey, and M. Kim is acknowledged and greatly appreciated.)

FIGURE 5

Office of the Dean

UNIVERSITY OF NEW YORK
HARPUR COLLEGE

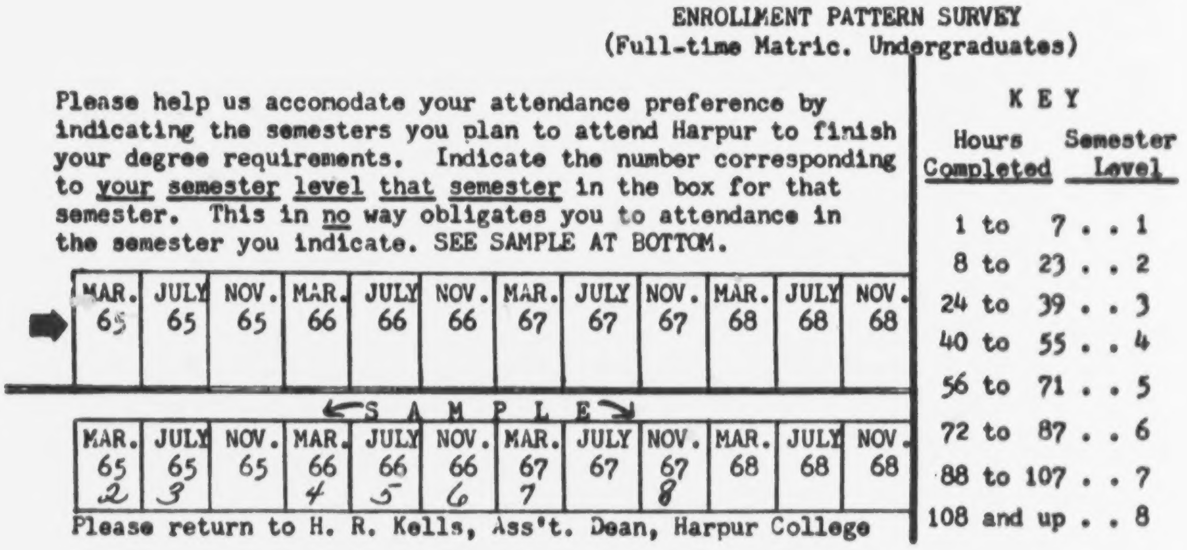
11-25-64

UNDERGRADUATE ENROLLMENT PROJECTIONS

		Actual			Estimated					
		1964-1965			1965-1966			1966-1967		
		Summer	Winter	Spring	Summer	Winter	Spring	Summer	Winter	Spring
Freshman	I	283	312	(60) 100	300	300	100	350	350	125
	II	49	285	(308) 303	97	291	291	97	338	338
	Subtotal	332	597	(368) 403	397	591	391	447	688	463
Sophomores	III	55	276	(247) 227	62	342	242	63	332	282
	IV	42	174	(273) 256	34	246	342	38	267	332
	Subtotal	97	450	(520) 483	96	588	584	101	599	614
Juniors	V	42	330	(172) 148	48	234	200	64	306	211
	VI	34	81	(303) 313	96	96	228	129	129	298
	Subtotal	76	411	(475) 461	144	330	428	193	435	509
Seniors	VII	51	290	(167) 80	92	250	73	76	292	100
	VIII	14	51	(186) 289	48	80	280	47	92	282
	Subtotal	65	341	(353) 369	140	330	353	123	384	382
Non-metric fulltime		0	4	(1) 5	0	5	5	0	6	6
Fulltime enrollment		570	1803	(1717 1721	777	1844	1761	864	2112	1974
Part-time equ. to fulltime		59	96	(100) 100	75	125	125	90	150	150
Total equated term roll		629	1899	(1817 1821	852	1969	1886	954	2262	2124
Student academic years		←	2175	→	←	2353	→	←	2670	→
Total term enrollment (Total number of students)		697	2031	(1940) 1990	931	2152	2061	1043	2472	2321
Above figures include following no. of transfer students		(38)	(76)	(58) (70)	(32)	(75)	(72)	(35)	(87)	(81)

FIGURE 6

Enrollment Pattern Survey Instrument and Summary of Results



ENROLLMENT PATTERN SURVEY
(Full-time Matric. Undergraduates)

Please help us accomodate your attendance preference by indicating the semesters you plan to attend Harpur to finish your degree requirements. Indicate the number corresponding to your semester level that semester in the box for that semester. This in no way obligates you to attendance in the semester you indicate. SEE SAMPLE AT BOTTOM.

MAR. 65	JULY 65	NOV. 65	MAR. 66	JULY 66	NOV. 66	MAR. 67	JULY 67	NOV. 67	MAR. 68	JULY 68	NOV. 68

S A M P L E

MAR. 65	JULY 65	NOV. 65	MAR. 66	JULY 66	NOV. 66	MAR. 67	JULY 67	NOV. 67	MAR. 68	JULY 68	NOV. 68
2	3		4	5	6	7		8			

Please return to H. R. Kells, Ass't. Dean, Harpur College

K E Y

Hours Completed	Semester Level
1 to 7	1
8 to 23	2
24 to 39	3
40 to 55	4
56 to 71	5
72 to 87	6
88 to 107	7
108 and up	8

Summary of the Approximate Enrollment Pattern Preference Distribution

(Figures are averages from enrollment pattern survey results for new students entering in the classes from July 1963 through March 1965)

Entering Classes	Number of Patterns Indicated*	Full Accel.	Traditional Length (11 semesters)	Traditional Pattern (on, on, off, etc.)	Switch to Nov., Mar. Pattern	Decel. (12 semesters)
July (N=399)	37	4%	40%	3%	45%	8%
November (N=490)	18	4%	85%	80%	---	<0.5%
March (N=106)	20	12%	6%	2%	60%	20%

*These are regular and odd patterns (regular = not more than one consecutive off semester).

Distribution of Regular and Odd Patterns

	Regular	Odd		Regular	Odd
July 1963	13	17	November 1964	14	4
July 1964	23	14	March 1964	14	6
November 1963	7	8	March 1965	12	2

FIGURE 7

Average Gross Enrollment Factors
(Calculated from the results of enrollment
pattern survey, retention, and transfer student information)

		Semesters after Entrance										
	Class Level	2	3	4	5	6	7	8	9	10	11	12
July Entering Classes [Based on July 1963 (N=141) and July 1964 (N=258)]	2	.95	.01									
	3		.71	.16	.05							
	4			.15	.70	.05						
	5				.10	.65	.04	.04				
	6					.10	.17	.44	.05			
	7						.04	.18	.47	.04		
	8							.04	.10	.18	.33	.08
November Entering Classes [Based on November 1963 (N=196) and November 1964 (N=294)]	2	.97	.01									
	3		.07	.85	.01							
	4			.07	.82	.01	.01					
	5				.03	.03	.74	.01				
	6					.03	.06	.70	.01	.01		
	7						.03	.05	.02	.69	.01	
	8							.03	.04	.03	.68	
March Entering Classes [Based on March 1964 (N=53) and March 1965 (N=53)]	2	.68	.30									
	3		.58	.35								
	4			.51	.13	.25						
	5				.14	.44	.29					
	6					.11	.39	.06	.23			
	7						.11	.08	.37	.25		
	8							.10	.08	.36	.07	.20

VERNON C. MICKELSON
CASE INSTITUTE OF TECHNOLOGY, CLEVELAND, OHIO

The methodology for planning at Case has two equally important, interrelated parts: organizational relationships and analytical techniques.

Organizational Relationships

The organizational aspects which make planning work at Case consist of reporting to the President, involvement of department heads, and a team approach.

Reporting to the President. Everyone likes to report to the top, and the Planning Office at Case is no different in this respect from others. However, its function is defined as the coordination of all planning activities at Case in the development of five and ten-year plans for the Institute, with the nearest year plan becoming in the fall the first-cut budget for the following year. That the plan becomes a strong influence on the budget is shown by the fact that the 1965-66 budget was within $100,000 of the planning budget of about $14 million. The influence of the Planning Office is strengthened by its direct communication with the chief executive.

A Team Approach. One of the reasons for success in gaining acceptance of the planning activity at the top administrative level is the development of a working team approach. This team has consisted of two members from the Planning Office, the two Vice-Provosts, the Business Manager and the Budget Officer.

To get "best judgments" on a wide variety of variables, the entire planning team tested approaches and results of calculations for reasonableness. Of the specific analytic techniques discussed later, the basic idea for one was contributed by a Vice-Provost and for another by the Provost. This team approach insured that a better job was done and gained acceptance in the bargain.

Involvement of Department Heads. It is highly desirable that those who carry out plans be as involved as possible in the development of plans. Better plans are generated this way and there is a stronger commitment to the plans by the people involved.

The mechanism for involvement has been the Provost's Office, or more specifically the two Vice-Provosts to whom our six departments, two divisions and four centers report. The Planning Office has taken an active, initiating role in this involving process, being careful at all times not to by-pass the Provost Office.

Recently, the chart of faculty and student numbers described later was distributed to all department heads. It was not received with universal enthusiasm, for most departments saw for themselves a smaller growth than they had anticipated. However the Provost's Office plans further involvement of department heads in the development and use of the plan as a tool to help achieve educational objectives within present and potential educational resources.

With understanding we expect acceptance will come and, of course, changes in the plan as they become necessary or desirable.

Analytic Techniques

Among the analytic techniques developed or adapted by the Planning Office, three have been especially effective: (1) the input-output model, (2) the estimation of research expense levels, and (3) the prediction of degree outputs, given "pipeline" information. For administrative purposes a chart of approved numbers has been found useful.

Input-Output Model. Although there is certainly nothing new in the concept of an input-output model, the Planning Office has found it most useful in its work. As a private institution, Case must make its contribution through high quality work at the graduate level in the physical science-engineering-management area. Ph. D's at Case will increase substantially over the next ten years, whereas in bachelor's degrees growth will be limited, relative to the national growth trend. The goal of 150 Ph. D's in 1975-76 is the key output number. In a most important sense, all of the other planning flows from this one number. Specifically, the number of new graduate students admitted in 1975-76 (310) and the number "in process" (900) derive directly from the output goal and some assumptions about improved effectiveness of the educational process.

A bit less directly, but nevertheless closely linked to the process are the undergraduate numbers, which should be roughly twice the graduate numbers. Thus, goals are set at 400-425 bachelor's degrees, 525-550 freshmen and 1,850 undergraduates "in process" in 1975-76. A subsidiary goal here is an improvement in the graduation rate of almost 25% (58% to 72%). One significant outcome of this segment of planning is the decision to build 400 fewer dormitory rooms than had been previously intended, a capital savings of about $5,000,000. For Case that is quite a bit of money.

Estimation of Research Expense. One of the most useful techniques the Planning Office has developed to date has to do with the estimation of the research expense level in future years. The importance of this item lies in the fact that for 1965-66, research expense almost exactly equals instructional expense, and in 1975-76, it will be about 1 1/2 times instructional expense.

The approach is based, first, on the concept that research activities represent one of the major means for educating all of the graduate students and that they also provide stipends for some of them. This is shown on Attachment A.

From the latest historical year, 1963-64, all the numbers but one can be inserted from the records. These calculations show that the percentage of all graduate students who are currently receiving their education through involvement in research activities is 58% (the prediction outcome will not differ if one uses another value).

For a future year, the Planning Office inflates the dollar values, inserts the plan numbers for that later year, and computes the research expense level from the formula, as seen in Attachment A for the year 1968-69. This figure is, then, the research expense component of the total academic budget for the year in question. A further analysis gives the dollars available for faculty salaries which are then converted to numbers of faculty.

Prediction of Ph. D. Degree Output. Since the graduate school has been growing rapidly, the Planning Office has not been able to use historical data directly as a guide to degree prediction. Therefore, it developed the technique of tabulating the numbers from previous resident graduate student entrance groups in the latest Ph. D. graduating class. The percentage for each entrance class then becomes a coefficient which can be applied to predict Ph. D's for future years. Attachment B shows this analysis.

It turned out that this formula is equally useful for determining inputs required to reach any given level of output. Recalling the goal of 150 Ph. D's, Case has also set goals of an "effectiveness ratio" of 1:6 (Ph. D.'s: number in pipeline) and 900 in the "pipeline." The question then arises -- how many should be admitted per year? Under a stable situation, the output number (150) divided by the sum of the coefficients (.369), gives the input number (407). This assumes, of course continuation of the coefficient values.

With the accumulation of additional data we hope to predict trends in the coefficient values and thus improve the predictive value of this approach. This will have the further value of giving us a measure of effectiveness, since an increase in the sum of the coefficients indicates a larger output for a given input. (We have, in fact, set a goal of sum of coefficients of .484, and an annual input number of 310 by 1975-76).

Chart of Approved Numbers. A key administrative instrument which displays the results of the analytic techniques as well as best judgments is a chart of faculty and student numbers approved by the President for planning purposes. This covers each department, division, and center year by year for the next ten years. These numbers (faculty, resident graduate students, post doctorals, and undergraduate majors) will be reviewed annually and can be changed then or at any time if compelling reasons exist. Some of us think that detailed planning by individual activity for ten years is not feasible. Experience may show that such detailed plans should be developed for the first five years only, and that appropriate groupings of activities should be used for the second five years.

In summary, we have found useful two classes of techniques -- organizational and analytic. We recognize that these are for the most part rather elementary, but anticipate that as time passes and our knowledge of the system increases, we can become increasingly sophisticated in our analyses.

ATTACHMENT A = RESEARCH EXPENSE

CONCEPT

Research Expense = Cost of Education + Cost of Student Support

$R = X N_1 K_1 + N_2 K_2$

where, for an historical year

R = research expense

X = percentage of a graduate student's education acquired through participation in research

N_1 = number of full-time graduate students

K_1 = cost of educating a graduate student for one year through participation in research

N_2 = number of students supported on research

K_2 = stipend of students supported by research

1963-64

$\$\,3{,}381{,}000 = (.58)\ (502)\ (K_1) + (189)\ (\$4{,}300)$

$K_1 = \$\,8{,}850.$

1968-69

K_1 (inflated) $= \$\,10{,}880$; K_2 (inflated) $= \$\,5{,}000$

$R = (.58)\ (710)\ (\$10{,}880) + (377)\ (\$5{,}000)$

$R = \$6{,}365{,}000$

ATTACHMENT B: PH.D. DEGREE PREDICTION

CONCEPT

$$D_y = K_y N_y + K_{y-1} N_{y-1} + \; .\; .\; .\; . \; K_{y-n} N_{y-n}$$

where

D_y = number of Ph. D's granted in June of year "y"

N_y = number of resident graduate students entering Case in fall of year "y"

K_y = fraction of students entering Case in fall of year "y" who received the Ph. D. in June of year "y", and other N'_s and K'_s are for successively earlier years.

1963-64 (historical)

$$D_{1964} = 54 = (0)\ (174) + (.013)\ (224) + (.041)\ (195) + (.121)\ (173) + (.067)\ (163) + (.057)\ (87) + (.056)\ (90) + (.014)\ (72)$$

1964-65 (prediction)

$$D_{1965} = (0)\ (260) + (.013)\ (174) + (.041)\ (224) + (.121)\ (195) + (.067)\ (173) + (.057)\ (163) + (.056)\ (87) + (.014)\ (90)$$

$$D_{1965} = 62$$

DONOVAN SMITH
UNIVERSITY OF CALIFORNIA

This paper will advance two general ideas concerning mathematical models of space utilization.

The first idea is that analyses of utilization rates and unit areas of instructional rooms can be improved by constructing a mathematical model which will focus attention on those data from a more revealing viewpoint than is provided by conventional analyses -- that is, by displaying the determining factors, instead of merely the resulting rates and areas.

The second idea is that for those and many other measurements, there is a better kind of numbers than the kind currently in use -- that is, numbers which explicitly indicate the variability or other uncertainty of the measurements, instead of unrealistically implying absolute precision.

Since scarcely any two specialists in this field use the same terminology, definitions of the abbreviations used in this paper are necessary:

ASF = Assignable Sq. Ft.--as sometimes still called "net";

SCrH = Student-Credit Hours--as commonly computed, if not also commonly disregarded in connection with space utilization;

WCH = Weekly Class-Hours--scheduled room-hours per week;

WSH = Weekly Student-Hours--scheduled station-hours per week.

A Mathematical Model of Utilization Rates and Unit Areas

The proposed model of utilization rates and unit areas is intended to focus attention on the factors that determine the utilization rates and unit areas of instructional rooms:

R = Room-Utilization Rate = WCH per Room
S = Size Ratio = (Mean Class Size)/(Mean Room Size)
T = Station-Utilization Rate = WSH Per Station
U = "Input" Unit Area = ASF per 100 WSH
V = "Output" Unit Area = ASF per 100 SCrH

(Throughout this paper, all student-credit-hour amounts are those of all kinds of instruction combined; all other amounts are those of the specific rooms and classes only.)

Specified numerical values of these utilization rates and unit areas may be perfectly reasonable goals. Building programs and capital-outlay budgets may properly be based thereon, just as a family budget may reasonably specify a certain number of "annual gasoline dollars." But just as that family can not do anything directly to the "annual gasoline dollars," the college or university cannot directly control a utilization rate or unit area. Thus, just as the family would have to decide specifically whether to drive fewer miles or to use cheaper gasoline, or somehow to get better mileage in order to reduce its "gasoline-dollars expenditure rate," the insitution should be able to identify and evaluate the directly controllable factors which determine its utilization rates and unit areas.

For that purpose, the room-utilization rate may be defined as follows:

$$R = \frac{A}{B}, \quad \text{in which} \quad A = \text{WCH per 10,000 SCrH}$$

$$\text{and} \quad B = \text{No. of Rooms per 10,000 SCrH.}$$

The room-utilization rate (R) is thus defined in terms of factors which not only are directly controllable, but also can be directly compared for instructional programs of unlike "sizes" with some hope of determining the possibly quite different effects of scale on the individual factors.

The conventional definition of the "size ratio" is sufficiently revealing if its component factors are kept in sight:

$$S = \frac{C}{D}, \quad \text{in which} \quad C = \text{Mean Class Size} = \text{(Total WSH)/(Total WCH)}$$

$$\text{and} \quad D = \text{Mean Room Size} = \text{(Total Stations)/(No. of Rooms)}$$

These four factors (A, B, C, and D) then suffice to define the station-utilization rate as:

$$T = \frac{A\,C}{B\,D}$$

The station-utilization rate thus appears to be determined by four variables. But the product of A and C can be defined as:

$$A\,C = 100\,F, \quad \text{in which} \quad F = \text{WSH per 100 SCrH.}$$

Thus:

$$T = \frac{100\,F}{B\,D},$$

thereby showing that the station-utilization rate depends, in fact, on three variables -- two representing directly controllable characteristics of the physical plant (B and D), and one representing a directly controllable characteristic of the educational program (F).

Then, by introducing a generally recognized factor, one can define the "input" unit area (ASF per 100 WSH) as:

$$U = \frac{B\,D\,E}{F}, \qquad \text{in which} \qquad E = \text{ASF per Station},$$

thus showing that this unit area, also, is determined both by certain directly controllable physical characteristics and by that same controllable educational characteristic. (Obviously, for physical-planning purposes, E should be expressible as an inverse Function of D -- thus again reducing the number of independent variables to three.)

Finally, for those who believe that space-utilization analyses on the "input" basis are not the whole significant story, the "output" unit area (ASF per 100 SCrH) can be defined as:

$$V = \frac{B\,D\,E}{100},$$

thus emphasizing that, for a given amount of "output," the student-credit-hour unit area is determined entirely by characteristics of the physical plant.

In short, we should give our attention primarily to these six directly controllable factors (A through F), and to the interrelationships disclosed by the formulas in this mathematical model, instead of continuing to tabulate and compare merely the unanalyzed composite effects of these factors.

Improving the Numerical Measurements

The second idea is the possibility of a better kind of numbers than the kind in general use. This paper proposes that all calculations should take into account the variance in the measurements, whether that variance consists in the uncertainty of a predicted amount, or in the variety of individual values which are represented too simply by the single-figure average of the actual amounts.

Consider, for example, the numbers and sizes of classes. Even with movable walls and computer scheduling -- whether Blakesley's Purdue system or Holz's GASP or someone's not-yet-devised GULP (Generalized University Linear Programing) -- there must still be already in existence an amount of building space which is at least potentially partitionable into the numbers and sizes of rooms necessary for classes which were at least a few years in the future when the space had to be funded and designed.

Thus, even if the average size of a given group of classes turns out to be exactly equal to the predicted average of those classes, it should be fairly reasonable to expect that those actual sizes would be distributed approximately in accordance with the bell-shaped curve in any elementary statistics textbook.

The University of California's data indicate that the standard deviation of the actual sizes of the classes assigned to a given size of classrooms is about 45% of the predicted mean size. There are indications, also, that interference with the beginning of instruction becomes intolerable if more than about 5% of the classes develop enrollments exceeding the number of stations in the assign assigned rooms if high room-utilization rates are to be achieved.

Turning to the appropriate statistical table, one finds that 1.645 standard deviations greater than the mean is the point on the normal curve of errors which will encompass all but 5% overflow (in number of classes). Then, by simple arithmetic, 1.645 times 45% is 74%.

Thus, on the average, the number of stations in the room must exceed the mean class size by 74% if the standard deviation of the sizes of the classes assigned thereto is 45%, and not more than 5% of those classes are to be too large for that room. If the room size exceeds the mean class size by 74% the size ratio is necessarily less than 60% (57.5%, to be exact).

Incidentally, if the question arises, there are at least two indications -- one theoretical, and one practical -- that not even computer assignment of students to the classes before the classes are assigned to specific rooms will escape the pattern imposed by the bell-shaped curve.

The purpose of this study, however, is not to offer an objective explanation of the general failure to exceed, if even achieve, the 60% size ratio which has been so widely adopted as a standard for classrooms. The point here is the more general one that considerable variance is necessarily characteristic of many of the measurements of utilization rates, unit areas, and the determining factors thereof, and that that factor, also, should be included in the mathematical models.

This is perhaps most important in projections of campus enrollments, and of the numbers and sizes of the individual classes. But one should not overlook other kinds of variance. For example, the mathematical models should allow for the fact that, for physical reasons, classrooms and class labs tend to exist with certain multiples of certain numbers of stations, avoiding many theoretically possible numbers almost entirely. A purely mathematical analysis of "possible" class size and room size relationships is likely to be quite unrealistic for this reason alone.

In conclusion, this paper suggests that even roughly "guesstimated" measurements of variance would be more realistic than the implied precision with which the results of calculations in this field generally are expressed -- whether in a mathematical model displaying the directly controllable factors as has been proposed here, or in a more conventional tabulation.

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An important contribution of institutional research is its assistance in decision-making at the highest administrative level. The research should be imaginative statistical analyses of quantifiable data, enumerating alternatives for decision-making in the evaluation of policy. [1]

At this point two terms which are vital to the meaning of the paper must be clarified. The authors propose that the term *assess*, not *evaluate*, should be used in the context of the statistical decision functions of an educational institution. *To assess* is to state, as Wald likes to phrase it, "Numerically for every possible state of nature in the situation under consideration the consequences of any of the actions taken."[2] The intention is not to be captious but to suggest that in an educational institution such a complex of processes and methodologies may be involved that conceptual separation of these processes and distinctive use of terms may facilitate administrative decision-making. Specifically, this discussion will attempt to establish 1) that there are three separate processes involved in educational decision-making: appraisal for statistical decision problems, evaluation for value decision problems, and predication for action decisions; 2) that each process has its own methodology and distinctive function; 3) that the processes are usually sequential in nature; and 4) that the appraising process and the evaluating process each provides the decision-maker with sets of alternatives different in kind for action. This study will begin with evaluation, as an educational institution evaluation inherently occupies a hierarchical position in decision-making to the appraisal (or statistical decision) process.

Operationally, a university or college is defined as a valuing enterprise. The assumption of "good" is implied in the term *valuing* and the process of evaluation. The "good," an affirmative term, is undefined, precluding classifying data or conclusions, for classifications are neutral. Valuing or evaluation will be operationally defined, then, as grading qualities[3] which imply a set of principles or grading according to some purpose or criterion. A "good" university is "good" according to its educational purposes or goals. The first proposition of this study is, then, that valuing, or evaluation, has nothing to do with assessing numerically; rather valuing or evaluation is concerned with premises embodying beliefs. Such beliefs and the consequent premises will have their sources in philosophy and the behavioral sciences. These premises and principles will be as rational and as logical as testable hypotheses. They do not entail, however, the conclusions drawn, as is the assumption in statistical inference. This kind of reasoning is generally called inductive. [4] The evidence constitutes adequate support for accepting the conclusion chosen in each case. They constitute arguments, but may not be deductively valid, although they are sound arguments.

The methodology for evaluation may consist, then, in evolving rules for reasonableness, admissibility, and credibility of evidence, as they are illustrated in the law and the American judicial process. The judge sees to it that the contest is waged according to recognized rules. The jury considers not only the facts but also the arguments advanced by each side. Therefore, it is an analytic proposition that, other things being equal, the evidence for a generalization is as strong in proportion as the number of favorable instances and the variety of circumstances in which they have been found are substantial. In essence the methodology is comparative in nature. It is proper to inquire of a particular belief whether its adoption is justified.[5] But in asking its value, one is asking whether there is "good," "bad," or any evidence for either -- terms alien to statistical inquiry. In describing premises of beliefs and their supporting evidence as being less than convincing, on the other hand the words of statistics, probable or probability or probably may be suspect. It is not to be assumed, however, that supporting evidence may not consist of quantified studies based on enumeration, but these studies are used in the evaluation process as support or non-support of an argument. In themselves, of course, they represent statistical inferences from analyzed data utilized to test and validate hypotheses.

An example of the differentiation between the kind of evidence considered statistically appropriate and that which may be supportive of an argument is an institutional decision to require of all freshmen work in the performing arts. A cost study presented a set of alternatives for increasing revenue or keeping the costs down. The winning argument, however, was that the experience is good for the individual, and a university ought to raise the public taste. Again, those who urge articulation of two-year and four-year colleges may speak of various probabilities of success of such transfer students, but urge the open-door policy of admissions on the basis of an argument embracing a value judgment: society benefits from an educated citizenry. The evaluation process is concerned with desirable conclusions. The question is what constitutes reasonable, admissible, and creditable evidence to support arguments.

Logically prior to evaluation is the process of appraisal. Here institutional research has contributed distinctively with its empirical studies in all sub-systems. An appraisal provides facts, objective and/or subjective. The latter are facts of a different kind but not necessarily of a different rank. The point here is that the chief characteristic of the appraisal facts and inferences from them will be statements that make explicit reference to a number measuring the probability. Any statistical decision problem is formulated with reference to a stochastic process. Cost studies, of course, lend themselves admirably to maximization as a decision principle; that is, in statistical decisions, the most generally useful strategy is one which maximizes the average gain or minimizes average loss over many similar decisions. The decision-maker can assess numerically the consequences of any of the actions he might take. The choice may be between the "minimax" principle or the "two-person games."[6] The term to use, however, is to assess numerically (not evaluate numerically) in an educational institution. The fundamental notion is that of probability QUA numerically measurable.[7] In a business the criterion is itself numerically measurable; in education that criterion does not always control the decision-making process.

In evaluation, "probably" is construed as "More probable than not." Here, the set of statements is equivalent not to numerical probability but to the comparative notion of reasonableness of belief. And reasonableness of belief cannot be measured in terms of any empirical frequency, e.g. of proportion of beliefs of the same sort that turn out to be true. The statement in the first form might be: the probability of an increase in costs from a curricular requirement is 1/5. The form of the second statement might be: on the evidence which we have, A's theory of the necessity for the requirement is more probable than B's.

Evaluators may yearn for F tests and t tests of significance but "significance" in evaluation may be had by establishing criteria (not yet developed) that determine the priority of the various arguments advanced, say on an institutional basis, and that judge the reasonableness or validity of the evidence supporting the arguments. The evauation of the significance of conclusions may be through aggregating value judgments derived from social, institutional, or individual systems of philosophy and ethics, behavioral systems, or even the tradition's viability. The institutional research staff may need someone, then, skilled in systems of logical analysis and in evolving arguments and appropriate evidence supporting arguments for value choices. It is inherent in the valuing process, of course, that alternative arguments cannot be consolidated into agreement or consensus. There will be discriminative choices for the decision-maker.

In the predication process, the decision-maker will balance, then, two types of conclusions: 1) inferences and alternatives based on essentially statistically validated conclusions (appraisal); and 2) alternative arguments buttressed by reasonably supportive evidence (evaluation). One set will be furnished by the statistican or administrative theorist; the other by the philosopher or the behavioral scientist. Predication of action will be based on weighted selection. Efforts to quantify valuing factors should continue. The research office at De Paul is exploring the model of benefit-cost analysis in economic theory now used in evaluating government welfare projects as a possibility. Even in this design absolute measurement of some benefits may be difficult to put in terms of common units. Its applicability to education is doubted by its strongest proponent.[8] The predication process is essentially an integrative process, the "judicial" combining according to some criteria of two kinds of evidence: numerical probability statements and arguments which say "more probably than not." The predication process is essentially qualitative. The curricular design for De Paul University, on display,[9] exemplifies our experience: the priority given by educational decision makers to premises of belief and the evidence adduced in support of the beliefs. Consequences for costs -- arising from radically different instructional methods and practices and administrative restructuring -- are implicitly subordinated to desirable goals and purposes. Appraisal studies, other than cost studies, were prior to and instrumental in generating curricular redesigning.[10] In any systems analysis in education, as in government where the requirement approach is largely used, choices will have been made before costs are considered. That presents, then, criterion and other problems difficult to resolve in even a cost-benefit analysis. In summary, it is suggested that empirical studies aid decision-makers in the appraising of alternative conclusions from a set of statistically derived inferences. The proposal here is that a different kind of methodology be evolved for the distinctive process of evaluation, and that consideration be given to adding to the institutional research staff those skilled in aggregating value judgments. The present call for papers seemed, in fact, to invite such elaboration of function for institutional research.

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Introduction

Have you ever planned for a class of fifty students only to find that a hundred enroll? Or have you ever constructed a building with six laboratory classrooms only to find that three were sufficient?

For some time we have endeavored to find solutions to similar problems at the University of California at Berkeley. We think we have made progress in this direction by developing a planning tool in which you, too, may be interested as a possible means of solving equal problems at your own institutions.

General Conditions At The University of California, Berkeley, Which Called For A New Planning Tool

In the late 1950's various academic and administrative committees, together with University-wide and State government officials, began discussions concerned with the value of operating the University on a year-round basis and the need of establishing a ceiling for the total number of students on each campus. The results of these discussions found expression in the Master Plan of Higher Education for California. From that time until now, these issues have been the subjects of considerable debate; and although the final solutions have not been reached, the current plans call for a student enrollment limit of 27,500 at Berkeley and a year-round operation based on a quarter-system calendar. These plans have created, among others, three separate, yet interrelated, problems for the Berkeley campus: the limitation of its enrollment, the conversion from a semester to a quarter-academic calendar, and the operation of the instructional and administrative plant during the summer quarter on a level closely comparable to the other quarters.

One critical aspect of these problems which affects and is affected by the numerous decisions required to implement the plans is the need to estimate the teaching load in each of more than seventy departments of instruction. The important aspect of the teaching load factor is that it carries a large share of the burden of allocating space, staff, and budget.

The scope of this paper precludes discussion of the multifarious problems which beset the University faculty and administration in the three problems mentioned; however, the ubiquity of class enrollments as a factor in academic planning is the core of this paper, for some attempt must be made to provide both faculty and administration with planning figures. For instance, the Department of Chemistry would not plan to offer twenty laboratory sections of basic chemistry each quarter term if the best estimate indicated that a minimum of thirty would be needed; and the Department of Paleontology would want to consider limiting its selection of course offerings in the summer if the best estimate indicated an average enrollment of less than five students per course.

What Numbers Are Needed?

Given the problems as stated, the Berkeley administration instituted a search for detailed numerical information to support the general educational goals established for calendar conversion and enrollment limitation. For example, recent trends among the undergraduate student population show that the proportion of majors in the fields of languages and literatures is increasing, and the proportion of biological sciences majors is decreasing. If this trend continues, even under an enrollment ceiling for the total campus, the University should provide for it and the subsequent changes it will bring, or the University should control it and plan for the effect of such control. In any case, the absolute numbers of student majors in each curriculum are directly related not only to teaching loads in the department offering the curriculum but also to other departments, even though not to the same extent.

As the graduate student numbers are allowed to increase while undergraduate numbers are forced to decline until the University's planned totals are reached, what will be the change in class enrollments in departments which provide upper division service courses to graduate students? What decisions are needed for staff planning if the summer quarter student distribution is heavily weighted with lower division and graduate division students and only lightly weighted with upper division students?

Because answers to these and numerous similar questions are too often ineffectively provided by simple numerical estimates, the Berkeley administration sought for a mathematical model to permit them to insert selected desirable or predictable answers to the questions which would yield workable teaching load figures.

General Principle for Matrix Model

A mathematical model was constructed from an analysis made in 1956, improved in 1957, converted to a projective technique in 1963, and programmed for computer application in 1964. The basic design of the mathematical model is a form of input-output matrix. The input-output techniques have been rather widely used in economic analysis, notably by such men as Professor Leontief of Harvard; however, we are not aware of its application to problems of academic planning. In our opinion, the input-output matrix, or, as we call it, coefficient matrix, can be applied at any academic institution. The underlying principle for the model is the assumed relative stability of a student's propensity to enroll in particular areas of course work. At least two factors combine to insure the stability of this propensity and allow for its predictableness. One factor is the set of requirements established for all curricula. Each set of requirements, usually consisting of a list of courses and minimum and maximum limits of course credits in designated fields of learning, results in a basic course teaching load. Added to the load is a second factor which consists of electives allowed in each curriculum. Course electives chosen by the students vary widely, but the propensity toward one area of study over another is measurable for the different student majors, that is, students who major in anthropology may consistently choose electives in art courses to a greater extent than they choose electives in music courses. Individual idiosyncrosies among the students in their choices of course electives introduce a variable factor to the assumed stability, but the added weight to the teaching load in a course is not significant. If one student art major in three hundred enrolls in an upper division mathematics course one year, and three students enroll the following year, the ratio varies considerably, but the effect on the teaching load is almost negligible.

Construction of the Matrix Model

In the construction of the mathematical model one may use as building blocks a variety of relationships between students and courses. Although the intervening processes between collection and application for the various formats are not identical, the essential steps are similar. The process begins with the collection of class enrollment data for individual students classified by their major field of study.

Class enrollments are accumulated for these student segments and are expressed in student credit hours (enrollments times course credit values). For each major the accumulation gives the total load created in all the courses of every department of instruction. A combination of all class enrollments by student major and departmental course results in a matrix of student credit-hour values which compares one factor with the other. If student majors are spread horizontally and departments of instruction vertically, then reading down a column would give the total credit hours created in each department by the majors heading the column; and reading across a row would give the total credit hours created by each major group for the department beginning the row. Furthermore, if the departmental rows and major columns are arranged by field of study, that is, engineering majors in the fifth column and departments of engineering in the fifth row, the student credit-hour figures which form the diagonal on the matrix will typically show the highest numerical values. The matrix cell where engineering majors meet engineering departments will contain a large number, but the cell where music majors and engineering departments meet will usually be empty.

After constructing the matrix of student credit hours, which, incidentally, can be achieved by hand matching class cards for colleges with small registrations, but which requires machine matching for institutions with large registrations, the next step is to introduce into the mathematical model the acutal counts of students by the major fields of study. One literally writes in the counts at the head of each column on the matrix. A division of the student credit-hour figured in each cell in a column by the count of majors heading the column provides the desired coefficients. A coefficient expresses the amount of work load created in a department per student major. For simplicity, the ratios can be expressed in a standard form as credit hours per one-hundred students.

Application of the Matrix Model

Having arrived at this point after much counting, accumulating, matching, and dividing, what is the next step?

At Berkeley we have applied or expect to apply the coefficient matrices to the several problems previously noted. The most recent application was at the atomistic level of educational instruction, for it projected course-by-course enrollments for the first planned year on the quarter calendar by considering students by individual major at each class level, freshman to graduate. In the near future, a series of simulated student enrollment expectations for the summer quarter will be programed in an attempt to discover the effect each would have on the individual teaching loads.

Application of the matrix of coefficients has thus far been limited to the Berkeley campus of the University of California. A short time ago, however, this new method was brought to the attention of the University President, which led to a recent University-wide meeting of planning and insitutional analysts who enthusiastically endorsed a proposal to begin the collection of the necessary data to construct local and University-wide matrices. The analysts who must plan building programs ten to twenty years in the future are particularly hopeful that the coefficients which emerge from this combined effort will show sufficient stability to permit their application to newly created campuses as well as to those still growing.

There appears to be unlimited scope in the variety of ways in which this new method can be utilized. Its main value lies in its ability to encompass simultaneously an institution's entire curricula. Short range and long range classroom needs and building programs should be able to effectively make use of selected matrices of coefficients. Additionally, after one has gathered sufficient historical data, the coefficients will show trends which lend themselves to prognostication. At Berkeley in the historical data graduate majors in the agricultural sciences are taking less work in agriculture and more work in the biological sciences. This trend and many other interesting facts were discovered through the application of the matrix of coefficients. The analysts look forward to finding more trends as this method is perfected.

Conclusion

In conclusion look at Examples 1, 2 and 3, which represent matrices for a hypothetical institution with an enrollment of 10,000 students in the Fall, 1964. The student credit-hour figures in each cell in Example 1, when reading down a column, represent the total load created in each area of instruction by the majors who head the column. One may discover in this table, for example, that almost ten per cent of the total teaching load in social sciences departments of instruction is created by engineering and environmental design student majors (2,119 of 24,930). Example 2, the table of coefficients for Fall, 1964, expresses this relationship between majors and departments as a ratio: every one-hundred students in engineering and environmental design curricula create, on the average, 99 student credit hours in social sciences departments.

Example 3 shows that the hypothetical institution anticipates a non-uniform growth in majors which will give the campus a total of 14,000 students by 1970. The institution assumes that the coefficients found in 1964 are stable for these broad areas of academic study and can be applied to the new distribution of student majors expected in 1970. The student credit hours in Example 3 become planning figures which can be used in allocations of space, staff and budget, and in projection of class enrollments. These matrices present a rather crude picture of departments and majors, but it is one which can be applied for practical analysis. Further contraction, of course, is possible. Expansion of the basic matrix for academic planning purposes would probably not go further than the latest format used at Berkeley. As previously noted, this consisted of coefficients which expressed the relationship between courses of instruction and major fields of study distributed by the student's class. As one may guess, the analysts never actually constructed a printed table of this matrix, since it would have consisted of about 150 columns and 3,500 rows.

The particular aggregation of students and courses depends on the purpose at hand. Short range projections would profit more from expanded tables while long range projections would profit more from contracted tables. The stability of the coefficients would be the main factor to consider in determining the character of the aggregation.

Another factor is the value of using the matrices to simulate different aggregations by eliminating or adding one or more major fields of study or one or more departments of instruction. Referring again to the three examples - if business administration were eliminated as a major and as a department in 1970, the load distribution would be reduced in every department except law by the loss of these students. On the other hand, these same departments would gain teaching load from the redistribution of credit hours that would have been created by majors in other fields taking business administration courses.

I close my remarks by extending an invitation to you to communicate with me regarding any work you may be doing in this area of planning. I also invite you to participate in a nationwide survey to discover the stability of the coefficients from one institution to another.

EXAMPLES OF STUDENT CREDIT HOUR AND COEFFICIENT MATRICES FOR AN INSTITUTION WHICH EXPECTS TO INCREASE FROM A STUDENT POPULATION OF 10,000 IN FALL, 1964, TO 14,000 IN FALL, 1970

EXAMPLE 1

STUDENT CREDIT HOURS - FALL, 1964

DEPARTMENTS OF INSTRUCTION	ARTS, LANGUAGES, AND HUMANITIES	SOCIAL SCIENCES	BIOLOGICAL SCIENCES	PHYSICAL SCIENCES	ENGINEERING & ENVIRONMENTAL DESIGN	PHYSICAL EDUCATION	BUSINESS ADMINISTRATION	EDUCATION	LAW	OTHER PROF. SCHOOLS	TOTALS
TOTAL STUDENT MAJORS	1,613	2,184	857	1,246	2,140	33	473	505	374	576	10,000
STUDENT CREDIT HOURS											
ARTS, LANGUAGES & HUMANITIES	13,210	3,953	711	1,632	2,696	45	393	404	1	196	23,241
SOCIAL SCIENCES	2,355	16,555	1,021	1,072	2,119	77	814	232	15	680	24,930
BIOLOGICAL SCIENCES	516	1,245	5,339	361	214	50	28	51	--	611	8,415
PHYSICAL SCIENCES	516	852	1,628	10,068	5,072	9	350	35	--	328	18,858
ENGINEERING & ENVIRONMENTAL DESIGN	16	22	26	287	14,959	--	61	1	1	35	15,408
ROTC & PHYSICAL EDUCATION	97	371	120	137	428	181	166	56	1	58	1,615
BUSINESS ADMINISTRATION	32	306	103	37	193	--	3,893	5	--	69	4,638
EDUCATION	452	524	69	25	21	57	24	2,687	--	23	3,882
LAW	--	--	--	--	--	--	--	--	4,847	--	4,847
OTHER PROFESSIONAL SCHOOLS	16	66	51	2	21	12	5	5	--	4,879	5,057
TOTAL STUDENT CREDIT HOURS	17,210	23,894	9,058	13,621	25,723	431	5,734	3,476	4,865	6,870	110,891

EXAMPLE 2

AVERAGE NUMBER OF STUDENT CREDIT HOURS CREATED IN THE DEPARTMENTS PER ONE HUNDRED STUDENTS - FALL 1964

DEPARTMENTS OF INSTRUCTION	ARTS, LANGUAGES, AND HUMANITIES	SOCIAL SCIENCES	BIOLOGICAL SCIENCES	PHYSICAL SCIENCES	ENGINEERING & ENVIRONMENTAL DESIGN	PHYSICAL EDUCATION	BUSINESS ADMINISTRATION	EDUCATION	LAW	OTHER PROF. SCHOOLS	WEIGHTED AVERAGE
TOTAL STUDENT MAJORS	1,613	2,184	857	1,246	2,140	33	473	505	374	576	10,000
COEFFICIENT OF SCH PER 100 MAJORS											
ARTS, LANGUAGES & HUMANITIES	819	181	83	131	126	136	83	80	*	34	232
SOCIAL SCIENCES	146	758	118	86	99	233	172	46	4	118	249
BIOLOGICAL SCIENCES	32	57	623	29	10	151	6	10	--	106	84
PHYSICAL SCIENCES	32	39	190	808	237	28	74	7	--	57	189
ENGINEERING & ENVIRONMENTAL DESIGN	1	1	3	23	699	--	13	*	*	6	154
ROTC & PHYSICAL EDUCATION	6	17	14	11	20	549	35	11	*	10	16
BUSINESS ADMINISTRATION	2	14	12	3	9	--	823	1	--	12	46
EDUCATION	28	24	8	2	1	172	5	532	--	4	39
LAW	--	--	--	--	--	--	--	--	1,296	--	48
OTHER PROFESSIONAL SCHOOLS	1	3	6	*	1	37	1	1	--	847	51
COEFFICIENTS BY TOTAL MAJORS	1,067	1,094	1,057	1,093	1,202	1,306	1,212	688	1,300	1,194	1,109

* LESS THAN .05

EXAMPLE 3

STUDENT CREDIT HOURS - FALL, 1970

DEPARTMENTS OF INSTRUCTION	ARTS, LANGUAGES, AND HUMANITIES	SOCIAL SCIENCES	BIOLOGICAL SCIENCES	PHYSICAL SCIENCES	ENGINEERING & ENVIRONMENTAL DESIGN	PHYSICAL EDUCATION	BUSINESS ADMINISTRATION	EDUCATION	LAW	OTHER PROF. SCHOOLS	TOTALS
TOTAL STUDENT MAJORS	2,807	3,291	1,142	1,711	2,730	28	537	674	425	660	14,000
STUDENT CREDIT HOURS											
ARTS, LANGUAGES & HUMANITIES	22,989	5,957	947	2,241	3,440	38	442	539	2	224	36,819
SOCIAL SCIENCES	4,098	24,946	1,348	1,471	2,703	65	915	310	17	779	36,652
BIOLOGICAL SCIENCES	898	1,876	7,115	496	273	42	32	67	--	700	11,499
PHYSICAL SCIENCES	898	1,283	2,170	13,825	6,470	8	394	47	--	376	25,471
ENGINEERING & ENVIRONMENTAL DESIGN	28	32	34	394	19,083	--	69	2	2	40	19,684
ROTC & PHYSICAL EDUCATION	168	559	160	188	546	154	186	74	1	66	2,102
BUSINESS ADMINISTRATION	56	461	137	51	246	--	4,378	7	--	79	5,415
EDUCATION	786	790	91	34	27	48	27	3,586	--	26	5,415
LAW	--	--	--	--	--	--	--	--	5,508	--	5,508
OTHER PROFESSIONAL SCHOOLS	28	99	69	3	27	10	5	7	--	5,590	5,838
TOTAL STUDENT CREDIT HOURS	29,949	36,003	12,071	18,703	32,815	365	6,448	4,639	5,530	7,880	154,403

PART IV

CONTRIBUTED PAPERS ON STUDENTS AND CURRICULUM

An Experimental Investigation of Drops and Adds
Charles F. Elton
Dean of Admissions and Registrar
University of Kentucky

A Qualitative System for Curricular Reform
George E. Grauel
Director of Institutional Planning
John Carroll University

Comparison of Graduates at the University of Pittsburgh (September 1959) Under Accelerated Program
Hilda Jones, Staff Associate
Planning and Policy Coordination
University of Pittsburgh

The Academic Success of Transfer Students
P. Kenneth Morse
Director of Evaluation Services
Eastern Michigan University

Characteristics and Changes in the 1961 Class, Baylor University
Joseph V. West, Director
Office of Institutional Research
Baylor University

CHARLES F. ELTON
UNIVERSITY OF KENTUCKY

Each semester is a birth process. There is the labor which precedes it -- planning and publishing a class schedule, finding room space to match professors, etc. Then there is the day of birth -- registration day, which is followed by the long agony of after-pains: drops and adds. Just as ladies relate harrowing obstetrical data, university administrators delight in horror stories about their latest registration. It's a game of one-upsmanship to relate how many drops and adds one had on his campus. It's always several hundred more than he had. But administrators laugh to keep from crying.

Not long ago there was a typical period of resurgent concern within the University of Kentucky administration about the problem of student dropping and adding. One visiting mid-western academic dean commented when he was asked how his institution coped with this problem, "Learn to live with it; it's a fact of life." This advice seemed to be the better part of valor, since no published research nor helpful suggestions seem to exist in this area.

As enrollments increase and institutions experiment with various types of pre-registration programs, the number of course drops and adds seems to explode geometrically. The faculty is quick to resent the time required to sign drop-add forms, and eventually the administration becomes concerned about their clerical costs. The conditioned response of most administrators to this problem is to assess a student fee for the privilege of changing a schedule. Regretfully, neither the effectiveness of this remedy nor its real cost is known.

To this author's knowledge, the most authoritative information about student dropping and adding comes from a survey reported by Mr. Fred Schlunz, the Registrar at Iowa State University, in the summer of 1963. Survey results were received from 35 universities. Their analysis seemed to indicate the following. Institutions which pre-classify and charge for dropping a course have around 58 percent fewer drops than institutions which pre-classify and do not levy such a penalty. Among institutions which do not pre-classify, the matter of charging or not charging made no difference in the number of course drops. There seemed to be a marked decrease in the number of courses dropped when the penalty was five dollars rather than one. Also, the greatest number of courses dropped occurred among preclassifying institutions on a semester calendar. However, one institution on a trimester calendar -- and without pre-classification -- had the largest number of drops. It should be emphasized that Mr. Schulnz urged the participating institutions to take the results with a grain of salt because of sample restrictions and the variability due to local conditions.

Since only six of these 35 universities reported more drops than the University of Kentucky, this university decided to study the problem in an experimental manner. The experiment consisted of changing the order of student registration between the fall and spring semesters for the 1963-64 academic year. This allowed for the testing of two hypotheses: first, that the frequency of course drops and adds is related to the type of registration schedule and second, that the frequency of course drops and adds is related to the time the student registers.

The University of Kentucky operates on a semester calendar with summer pre-registration for entering freshmen and senior students. Graduate students and students in the professional colleges of law, medicine and dentistry are registered separately and were not included in this study. The administrative policy is that students have the privilege of dropping and adding courses without additional cost to the student. During the fall registration, sophomore and junior students reported in alphabetical order to the central registration area over a two-day period, freshmen and seniors having pre-registered during the summer. During the spring semester registration, all students reported to the registration area according to their cumulative grade-point standing. This registration lasted two and one-half days. The analysis reported later includes data only for the first two days. Students with the highest cumulative grade-point average registered first and in descending order until all were registered. All undergraduate students with a C average or higher had registered by noon of the second day.

Because of the pre-registration of the freshman and seniors it was not possible to make comparisons regarding the time of registration between semesters. Therefore, the hypotheses to be investigated were restricted to sophomore and junior students. The comparison of the number of courses dropped and added is reported in Table 1.* Previous data had indicated that approximately 73 percent of the total number of drops and adds occurred within the first two weeks of the semester, and the numbers given in Table 1 are for this period for each semester. Because University rules provide that no class may be added after the sixth day of class work, this fact is not surprising. Students enrolled in an average of 5.6 courses for the fall semester and 5.7 courses for the spring semester, although 1054 fewer sophomore and junior students registered for the spring semester than for the fall term. These students are presumed to have transferred to another institution, left higher education, or registered later. The late registrants were not included in the analysis.

Is there a relationship between the type of registration schedule and the number of drops and adds? A chi-square test was made of the null hypothesis that the total number of drops and adds occurring in the fall and spring semesters was due to chance. The chi-square value of 342 is clearly significant. Therefore, the hypothesis must be rejected, and it is concluded that the number of course changes is related to the type of registration schedule.

Is the time during which the student reports for registration related to the number of course changes? It is commonly believed that students registering during the second day, in a two-day registration period, will drop and add more courses than students registering the first day because of less freedom of choice in courses and hours. The null hypothesis was that there is no difference in the number of courses dropped and added between the first and second days of registration for each semester. The chi-square value for the fall semester was 4.36 which is not significant at the .001 level. Thus, in an

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*The author wishes to acknowledge the programming assistance of Mr. John Ordway of the University of Kentucky Computing Center.

TABLE I

Number of Courses Dropped and Added
by Sophomore and Junior Students
During the Fall and Spring Semesters

	FALL				SPRING			
Time of Registration	Number Registered	Number of Drops	Number of Adds	Total	Number Registered	Number of Drops	Number of Adds	Total
8:00 1st day	287	111	99	210	135	13	2	15
9:00 1st day	217	112	57	169	147	30	15	45
10:00 1st day	338	122	98	220	130	19	1	20
11:00 1st day	240	51	46	97	142	32	9	41
12:00 1st day	163	45	63	108	75	12		12
1:00 1st day	218	80	83	163	156	25	7	32
2:00 1st day	223	58	82	140	148	17	1	18
3:00 1st day	209	56	51	107	145	31	7	38
4:00 1st day	121	48	55	103	149	20	3	23
Total	2016	683	634	1317	1227	199	45	244
8:00 2nd day	214	68	73	141	150	17	6	23
9:00 2nd day	203	82	85	167	168	36	1	37
10:00 2nd day	218	86	115	201	164	41	2	43
11:00 2nd day	219	76	117	193	158	59	11	70
12:00 2nd day	126	31	55	86	90	11	1	12
1:00 2nd day	191	77	105	182	179	50	13	63
2:00 2nd day	189	82	98	180	176	56	3	59
3:00 2nd day	235	86	117	203	158	41	5	46
4:00 2nd day	59	27	53	80	146	52	1	53
Total	1654	615	818	1433	1389	363	43	406

alphabetical registration schedule, students registering the second day did not change their schedules more frequently than did those registering earlier. The chi-square value for the spring semester was 263 which could have occurred by chance less than one time in a thousand. With registration by grade-point average the number of course changes is associated with the time the student reports to the registration area. These data suggest support for a widely held belief, namely, that the student with lower academic achievement tends to register for more courses than he intends to complete. Since the number of courses added in the spring semester is almost the same for each day of registration, it appears that these students drop the one or two courses in which it seems most difficult to obtain a good grade.

The present study also provides some support for the conclusions reported by Mr. Fred Schulnz. The freshmen who pre-registered for the fall semester dropped 1051 courses and added 1201 courses; without pre-registration in the spring semester they dropped 552 courses and added 246 courses. Pre-registration as compared to a field house registration produces twice as many courses dropped and five times as many courses added. The senior students who also pre-classified for the fall semester dropped 371 courses and added 848 courses; following the spring registration they dropped 221 courses and added only 50 courses. The seniors added many more courses than the other groups in the fall semester. This suggests that either the senior student is not concerned about meeting graduation requirements during the pre-classification period and/or that there is a lack of competent faculty advising during this time. It is likely that both sets of conditions operate to swell the number of courses added.

In summary, it appears that the number of course changes may be reduced by altering the registration pattern. A replication of this study is necessary before generalizations are attempted. Perhaps there are other more significant variables which are associated with the frequency of course changes. For example, in the present study, academic aptitude and sex differences were uncontrolled. It seems most reasonable to believe that the effectiveness of the academic advisory program is an important variable in the frequency of student dropping and adding. When a college or university undertakes a program of improvement in its faculty advising, the number of course changes might be an interesting dependent variable. Certainly, the extent to which departmental course offerings are changed after the class schedule is printed should be related to the number of course changes. Another institutional factor which may be of importance is the extent to which instructor names occur opposite the courses which are listed in the class schedule. "Staff" is not a popular professor. The number of course changes could also be employed as one criterion of the effectiveness of instruction.

Perhaps the most important finding is that the drop-add phenomenon is an expensive symptom. The Registrar's office received a $723.81 bill from the computing center for processing drop-adds for the fall semester. Fortunately, the same job cost only $144.20 for the spring semester. One cannot spend all of one's money on aspirin. The problem here is to make a diagnosis to find out just why students drop and add.

GEORGE E. GRAUEL
JOHN CARROLL UNIVERSITY

Part I. Background of the Problem

American college education is entering upon a period that almost surely will witness ultimately either elimination or radical modification of the credit system. The credit hour was adopted as a convenient means of measuring, recording, and communicating educational progress.[1] Bolstered by a system of grades or quality points, it also has served somewhat as an instrument to indicate qualitative achievement. However, its chief limitation has always been that it results in a quantified attitude toward education and toward the degrees that symbolize education.

Early in America's educational history college curricula were defined in terms of a certain number of courses required for a degree. Late in the nineteenth century, following the standardization of high school studies by the Committee of Ten, this practice gave way to prescription of a specified minimum of credit hours that were granted in various quantities by the courses needed for a degree.

At that time institutions of higher education defined a credit hour as representing three hours of academic work per week for a semester by the student: one hour of instruction plus two hours of private study. Some traces of this original meaning still survive, but the credit hour now relates more exclusively to a controlled amount of classwork apart from varying amounts of private study.

Today, however, the credit hour is assigned, granted, used, and withheld in such a variety of ways both among and within institutions that no firmly standard definition is possible. Laboratory periods, combinations of laboratories and quiz sections, large-lecture-plus-small-recitation scheduling, remedial work, advanced placement, language laboratories, mixed graduate and undergraduate classes, programmed learning, and a host of other academic and administrative complexities have confused the value of the credit hour to the point that a credit hour represents whatever a given institution, or one of its departments, chooses to make it at any given time.

The major obstacle to breaking away from this system, of course, is the need for interchangeability among institutions of higher education. Long ago the University of Chicago courageously broke through this barrier in an independent action that had few immediate imitators, but the signs are many that educational institutions, professional organizations, and accrediting agencies now mean to face the issue and try to work out a solution. Anything less would be an inexcusable dodging of reality and of research into reality.

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[1] Cf. Gerhard Dietrich, "The Emergence of the Credit System in American Education Considered as a Problem of Social and Intellectual History," AAUP Bulletin, XLI (December, 1955), 647-668.

Faculties throughout the land decry the student mentality that seeks only a degree rather than what the degree represents. They insist, very rightly, that the student should be concerned not with amassing credits or even with earning grades, but with intellectual development. Colleges exist not to survey portions of literature, mathematics, or science but to discipline the minds of the students in these modes of thinking and inquiring. Nevertheless the student's whole college career is structured in a way that conspires against development of such a viewpoint.

The spreading dissatisfaction with quantitative definition of a college education not only has a common-sense basis but is supported by a long sequence of impressive investigations that show the hollowness of the credit system and that counsel radical reform. The record is well summarized in a publication of the American Council on Education: W. Max Wise, They Come for the Best of Reasons. Other more recent studies strongly support and confirm the earlier objections to the credit system. In 1959, for example, the Fund for the Advancement of Education summarized a whole group of projects that it had sponsored, stating in part as follows:

> One great difficulty with the traditional patterns of education is that they are presented to students in fairly rigid "units" which may be administratively convenient but which are educationally inefficient and actually hamper the student in making the most effective use of his time and that of his instructors for his learning. In most colleges and universities, we have acted on the assumption that there is not effective learning unless a professor offers a course "packaged" in quarter or semester units of a given number of hours a week and the student is exposed to direct instruction in the required number of hours. Content must be padded or trimmed down to fit neatly into the credit unit prescribed for a course and, generally speaking, innovations which would disturb the complex schedule of classes are discouraged.[2]

Essentially, the same position has been taken by the Committee on the College Student:

> If the degree is to indicate a level of accomplishment and to be in part a reward for excellence, the college must either seek a new basis for its award or make important distinctions among the degrees to be earned by 4 years of study . . . . To equate education and time is to denigrate the value of both, particularly the former; it is to declare that the educated man is one who has spent 4 years or 8 semesters at an institution of higher learning, which is an indefensible thesis. Not that many, indeed any, would

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[2] Better Utilization of College Teaching Resources, A Summary Report (N. Y., Fund for the Advancement of Education, 1959), p. 12.

> defend it: but it is the reductio ad absurdum of the proposition that the 4-year baccalaureate program is sacred.[3]

Without belaboring an argument that could be overwhelmingly supported by the literature of educational research and opinion, the essential point is simply that curricular reform today should abandon traditional quantitative norms as the terms in which a degree, program, core, or other feature of the academic offering of a college is defined. This paper, therefore, proceeds from the premise that education is formation produced by a pattern of studies (however provided or engaged in) that educators call the curriculum, that the student's progress in the curriculum is a matter of his personal development in the disciplines involved, and that this development should be judged chiefly (but not necessarily wholly) by qualitative measurements.

The remainder of the paper considers two basic problems: in Part II, the problem of how to define and administer a curriculum on a qualitative basis; and in Part III, a suggestion of how interchangeability among institutions for transferring students can be achieved if qualitative instruments replace the credit hour.

Part II: Curricular Planning under a Qualitative System

There seems to be no necessary reason why the whole traditional departmental structure cannot be preserved under a curriculum administered by qualitative measurements. For the needed adaptation, however, each discipline would have to accept responsiblity for several planning stages: (1) identification of the skills or areas of intellectual development that require formation and maturing in a student if he is to be granted a degree that embraces such departmental study (Hereafter these identifications are referred to as "competencies."); (2) recommendation of how these competencies should be defined and by whom; and (3) preparation of definitions of these competencies.

The variety of curricular plans possible under a qualitative system is as numerous as under the traditional, quantitative system. In other words, the measurement of educational progress and achievement by competencies is adaptable to any pattern of core, concentration, major, or minor. For simplicity and familiarity, examples will be related to a liberal arts degree, but the same kind of planning is possible for any university unit or curriculum.

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[3] W. Max Wise, They Come for the Best of Reasons (Washington, American Council on Education, 1958), p. 45. Brother Francis Emery, F.S.C., also attacks "the concept of the credit hour for measuring and recording academic work and as the ambiguous symbol for determing the right to be graduated from a college or university" in his article "Evaluating Dated Credits," College and University (Spring, 1964), pp. 319-324. For an especially effective assault on the credit unit, see Margaret F. Lorimer, "How Much Is the Credit Hour?," The Journal of Higher Education, XXXIII (June, 1962), 302-306. The addresses delivered at the 50th Anniversary Meeting of the Association of American Colleges (Washington, January 14, 1964) provide other recent evidence of current thinking by American educational leaders who seek qualitative reform of curricula.

The academic offerings might be grouped, somewhat as Doctor Shuster suggests, as follows:

I. The Means of Communication
  English
  Classical Languages
  Modern Languages
  Speech
  Fine Arts

II. Man in His Social Relationships
  History
  Political Science
  Education
  Psychology
  Sociology
  Physical Education

III. The World of Scientific Phenomena
  Mathematics
  Biology
  Chemistry
  Physics

IV. The World of Mind and Spirit
  Philosophy
  Theology

Suppose now that the Department of English decides that one of the areas of competence needed by the educated man is written communication in the basic kinds of discourse (exposition, narration, description, and argumentation). This competency would then be defined by a fairly extensive specification of the exact performance required of a student to be certified as competent in this respect.

It would be possible, but not necessary, to refine this definition of competency in such a way as to recognize various levels of performance. For example, the definition could be broken into three parts so as to certify a student as (a) adequate, (b) superior, or (c) honors. Or it could be levelled to correspond with the present grades of A, B, C, and D. Under the latter plan, the present system of quality points could be preserved. Under a plan of three levels, adequacy could be required in all competencies to be used toward a degree, and various percentages of superior or honors levels could be exacted for *cum laude*, *magna cum laude*, and *summa cum laude* degrees.

If competencies are to be made anything more than just a new dress on an old clotheshorse, permission must be given to achieve them in various ways. In other words, competency should consistently be regarded as a determination by the university to judge and certify what a student knows, not how he has acquired it or how many courses he has completed. In general the means of developing students to competency can remain the traditional departmental course, but competency should be demonstrable by at least two methods:

1. Passing (at a specified level) of a departmentally prescribed program (course or courses).

2. Passing of a departmentally prescribed examination.

Thus it might be that a student, through completing En 1-2 or equivalent, would be certified as competent in written discourse. Or if he developed this skill by other means, he could subject himself to examination and by performance on a required level earn certification for the same competency without formal course work.[4]

A Financial Sub-Note

Would certification of competency through examination be an intolerable and largely incalculable threat to the university's income if tuition is now based on the credit hour? By no means; it can be tied to a concept of "service unit" which would provide for a fee in relation to service rendered.[5]

Put otherwise, this proposal merely brings to educational life a concept that is readily accepted in other professional areas. When one goes to the physician's office and pays $25.00 for fifteen minutes, he does not object that it is a high hourly rate because he is paying for years of study and training and experience that enable the physician in fifteen minutes to deal competently with the problem. One is also paying for the office, staff, equipment, and certification the physician must maintain to provide this service. Similarly, a university has gathered a faculty, built up accreditation, constructed a plant, provided laboratories and a whole host of other facilities that enable it to service the student who seeks a college education. All its resources are necessary to its accreditation; and even the student who takes an examination has indispensable need of that accreditation. When the university serves him by certifying a competency, it should no more be paid on a per-hour basis than is a surgeon in an operating room or a lawyer in a courtroom. Consequently, it would seem proper to charge a student the same fee for certification of a competency whether it be achieved by examination or by a course. A barber could proctor the examination, but the barber has no means of interpreting it; and even if he had, he has no means of supplying a certification acceptable in the multifarious relationships of modern business and professional life.

Part III: Transfer under a Qualitative System

Transfer of students with their completed educational progress from one institution to another requires an instrument of measurement that is common to both. This is the leading merit of the present credit system, which has national prevalence. Once a system of competency certification has been established nationally, transfer under it will be as facile as under the credit system. What can be done in the interim?

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[4] This, of course, is no radical innovation. A survey of institutional practices in granting credit by examination is given in Number 9 of the HEW "New Dimensions in Higher Education": Lanora G. Lewis, The Credit System (Washington, Government Printing Office, 1961). The same booklet gives an excellent survey of development, difficulties, and trends of the credit system. See also College Without Classes (Center for the Study of Liberal Education for Adults, 1961).

[5] See the author's "Tuition Should Be Based on Use of Facilities, Not Credits Received," College and University Business, XXXVIII (April, 1965), 48.

The large institution can be as independent as the University of Chicago was in its pioneering under the direction of President Hutchins. Even for the smaller institution experiment is always possible; Lake Forest College, Allegheny-College, and Colorado College, for example, are now setting up four-year programs without classes, grades, or credits. In general, however, for the transitional stage a means of translating competencies into the old quantitative terms seems useful until the credit system has been nationally replaced.

Such translation can be accomplished very easily by a table of course equivalents for all competencies certified by the school. By such means, for example, a student who passes an examination showing adequate competence in college algebra can be recorded as having three credits in college algebra with a grade of C, B, A, or honors according to the system of levels or grades integrated with the competency definitions. Thus a transcript as fully conventional as any now being issued would be assured.

One other aspect of transferring should be considered, a feature that deserves the most serious kind of precaution and that is deeply important to the student and a condition of survival for the institution. This is the matter of confidence: the respect and acceptance of the receiving institution in the transfer process.

Provision of a negotiable transcript is the first phase of transfer; evaluation of the transcript by another institution and granting of corresponding advanced standing is the second phase. Institutions will be understandably reluctant to grant transfer credit unless they feel sure that the transcript truly represents the educational accomplishment that is recorded. Just as other institutions, therefore, must have confidence in the worthiness of the qualitative system, so too the university must be solicitous about establishing and administering it.

The key to the whole problem lies in the manner, thoroughness, and reliability with which the competencies are defined and tested. This is at once the crux of the plan, the most obvious feature for support by educational foundations, and the most confident means of assuring stability, permanence, and widespread acceptance.

As previously indicated, departments can prepare initial, working drafts of competencies, but a more formal and public review is needed for national purposes. The best procedure seems to be to involve the established diciplinary organizations, working under the sponsorship of the regional accrediting agencies, in the process. Thus the National Council of Teachers of English could deal with writing, the American Chemical Society with chemistry, the Modern Language Association with languages, and so on. More simply perhaps, disciplinary committees of recognized scholars could be directly established by the accrediting agencies for the task.

For almost two years, of course, the College Entrance Examination Board has been concerned with a task closely related to this thesis. Thus, the Council on College-Level Examinations, announced in April, 1965, has been established "to attempt to develop a national system of placement and credit by examination."

The intellectual disciplines are too numerous, however, and the variety of courses within any one of them too variable for this council to do unaided the whole task this author is proposing. Once academic areas within disciplines have been delineated, and once levels of competency for each area have been defined, the council can lead in development of suitable examinations. It can even collaborate on the delineations and definitions, but the technical leadership during these first two stages seems obviously to belong to established scholarly and professional organizations in the various fields. A pilot operation in one well developed field such as English, history, or mathematics should yield the necessary experience to broaden the procedure to the entire university.

A program developed and approved in this way, under the combined guidance of scholars and educational organizations, would result in no skepticism toward any student transferring under it. Any institution could feel confident about receiving him under this kind of certification. Within this system universities would be transferring a trained, competent student rather than an array of quantitative credits often difficult to interpret and evaluate.

Part IV: Conclusion

The national climate is favorable for reform, and radical revision of the credit system is simply a matter of time. Is it best for the individual institution to await developments, to fall in line and to accept changes only when they are forced upon it from the outside? Or does the tradition of seeking truth, expanding intellectual horizons, and discovering new avenues to human improvement carry with it an obligation to independent thinking, originality, and creativity?

Admittedly, the proposal here made is incomplete and over-simplified. The complex ramifications of the curricula in American higher education cannot be totally treated in a few paragraphs or pages. The real purpose of the presentation, therefore, is twofold: (1) an indication of approach that seems eminently feasible; and (2) a plea that the reform is very much worth undertaking. Lake Forest College, Allegheny College, and Colorado College should not be alone in leading the Black Angus from their campuses to the abattoir.

HILDA JONES
UNIVERSITY OF PITTSBURGH

Introduction

The University of Pittsburgh, since the adoption of the trimester calendar, September 1959, has made a series of ongoing studies of students at the University from several points of view. First, the members of each entering freshman class answer a questionnaire asking for certain socio-economic data along with long-range educational plans, their own perception of their academic ability, and the patterns of trimesters that they expect to attend at the University. Two major studies have been made of stratified random samples of all the students in attendance at the University, again in terms of socio-economic data, academic aptitude as measured by scholastic aptitude tests, academic performance as measured by quality point average, and attitudes toward the trimester calendar. Another series of studies, of which this paper reports the latest, has analyzed information supplied by students within a month of their earning the baccalaureate degree at the University of Pittsburgh. The data which are obtained from these students, also by means of a questionnaire, include socio-economic information as well as their plans for graduate or professional school, their attitudes toward the quality of the education they received, and their attitudes toward year 'round education in general.[1]

Method

A questionnaire (attached) was mailed to each of the students who was an entering freshman in September 1959, September 1960, and September 1961, after he had applied for graduation from the University. By late March 1964, three major kinds of groups were available for study. The first included students who have graduated with maximum acceleration (2 2/3 years) and there are now three such groups of students; students who have graduated in any accelerated pattern 2 2/3 years, 3 years, 3 1/3 years; students who have graduated in the traditional four years, (and there are now two groups of these); and students who have taken longer than four years, (and there is now one group of these). The present study compares for students, in terms of the number of trimesters elapsed between their matriculation and graduation, the socio-economic information, academic achievement, plans for graduate and professional study and attitudes toward the trimester calendar. Students graduating in fewer than eleven trimesters elapsed time between matriculation and graduation are classed in this study as accelerates; those graduating in eleven trimesters elapsed time, as traditionals; and those in more than eleven trimesters elasped time, decelerates. Actually, five separate comparisons were made, each of which will be discussed in this paper:

1. All of the students applying for graduation at any time between April 1962, and April 1964, inclusive, who were entering freshmen in September 1959, September 1960, and September 1961, were compared in terms of trimesters elapsed to graduation. This group includes students who were accelerates, traditionals, and decelerates.

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[1] This study was supported in part by the National Science Foundation Grant. No. G-11309.

2. This section compares the characteristics of all the students graduating at any time between April 1962, and April 1964, inclusive, who were entering freshmen in September 1959. In this group also are accelerates, traditionals, and decelerates.

3. This analysis compared the three groups of students with maximum acceleration: those entering in September 1959 who graduated in April 1962; those entering September 1960 who graduated April 1963; and those entering September 1961 who graduated April 1964.

4. The two groups of traditional attenders were compared in this analysis: students entering as freshmen September 1959, who graduated April 1963; and those entering September 1960, who graduated in April 1964.

5. The entering freshmen, September 1960, who graduated April, August, or December 1963 (accelerates), were grouped and compared with those graduating April 1964 (traditionals). This comparison is similar to the one described in point two for the entering freshmen, September 1959.

Chi square analyses of expected distribution compared with obtained distribution were made to indicate which parameters occurred with a sufficiently greater frequency than can be attributed to chance, to presume a relationship between the parameter and the trimesters elapsed between matriculation and degree. The facilities of the University Computation and Data Processing Center were used for the statistical analyses.

Results

All students graduating April 1962, through April 1964, who were entering freshmen September 1959, 1960, 1961

Acceleration in terms of school or division in which the student was matriculated was highly significant, with fewer accelerates enrolled in Business Administration, Engineering, and the Social Sciences than would be expected by chance, and more accelerates enrolled in Education, Nursing, and the Natural Sciences. Of the traditionals, more were enrolled in Business Administration, Pharmacy, and Social Sciences than would be expected by chance, but fewer in Education and the Natural Sciences. More of the decelerates were enrolled in Business Administration and Engineering and Mines, and fewer in Education, than would be expected. The other enrollments were all as would be expected by chance.

Sex was significantly related to terms of attendance, with a larger proportion of males attending in the traditional or decelerated patterns and a smaller proportion of females. More females and fewer males attended in an accelerated pattern than would be expected by chance.

Trimesters of attendance were also significant in terms of pattern of attendance. Both traditionals and decelerates attended ten or eleven trimesters more often than would be expected by chance, rather than the eight trimesters that are normally expected for graduation. This would seem to indicate that the traditionals and possibly the decelerates were carrying lighter credit loads over more trimesters rather than attending only two trimesters per year.

As would be expected, age was also significantly related to trimesters elapsed to graduation, with the ages of more accelerates between 18 and 20 and fewer 21 and over; with more traditionals, 21 and 22; and more decelerates, 22 and 23, than would be expected by chance.

Although permanent residence was not statistically significant, University residence was, with fewer accelerates living at home and more in the University dormitories than would be expected by chance. The traditional and decelerates were more likely to live at home and less likely to live in a University dormitory.

Cumulative quality point average, as reported by the students, was significantly related to terms of attendance with more accelerates having a quality point average of 3.5 or above and between 3.0 and 3.5 than would be expected by chance, and fewer accelerates with a score below 3.0. Fewer traditionals had quality point averages of 3.0 or above, more traditionals had QPA's below 3.0 than would be expected by chance. The decelerates were more likely to have quality point averages 2.5 and below and less likely to have averages above 2.5 than would be expected.

Family income for accelerated students was less likely to be between $6,000 and $9,000 and more likely to be $15,000 and above than would be expected, while traditional attenders' family incomes were less likely to be from $3,000 to $6,000 and more likely to be from $6,000 and $15,000 than would be expected by chance. Family incomes of decelerates were more likely to be between $3,000 and $9,000 than would be expected by chance, and less likely to be $12,000 and above.

Closely related to family income was the parameter of source of direct educational expenses. The accelerates were more likely to be financed by their parents and relatives, and less likely to be financed through their own work and savings than would be expected by chance. Both traditionals and decelerates were less likely to be financed by parents and relatives and more likely, by their own work and savings. Although the financing of living expenses during the collegiate experience was not significant, there is a trend in the same direction as the financing of the educational expenses.

When asked their attitudes toward long-term borrowing, fewer of the accelerates were strongly favorable than would be expected. More were moderately favorable and moderately unfavorable, fewer neutral. The traditional group tended to have fewer moderately favorable and more neutral toward borrowing than would be expected, while the decelerates had more students favorable and fewer moderately unfavorable than would be expected. This characteristic, which appears in all of the analyses, might indicate that the student who has taken longer than four years to complete his education, possibly because he must drop out from time to time to earn money to finance his degree, sees the advantage which has been insisted upon from the adoption of the calendar by the administration of the University, of borrowing money to complete the degree and repaying it from earnings at a professional level rather than from a part-time, sub-professional job held while the student is in school.

The students' attitudes toward year 'round education in every analysis that has been done of every group, consistently relates attitude toward year 'round education directly to the performance of the student in college. In other words, there is a highly statistically significant relationship between number of trimesters elapsed between matriculation and graduation and attitudes toward year 'round education. Many more accelerated students than would be expected by chance, are highly favorable or moderately favorable toward year 'round education and fewer neutral and opposed. Of the traditionals, fewer than would be expected approve it highly or moderately and more than would be expected are neutral or slightly or very negative toward it. Fewer decelerates tend to be strongly favorable and more tend to be moderately negative than would be expected.

Many students in institutions considering year 'round education and a number of faculty are concerned about the non-academic effect of the year 'round calendar on student life. It is interesting that in this sample the students' participation in both formal and informal activities was not significantly related to the trimesters elapsed between registration and graduation.

When the students were asked whether they plan to continue their education to obtain a graduate or post-baccalaureate professional degree, there is no significant difference in replies among students who have graduated in an accelerated, traditional, or decelerated pattern although there is a trend for the accelerated student to be more likely to say that he is definitely planning to continue his education than for the other two groups. When, however, students are asked to indicate for what type of graduate experience they have applied, there is a statistically significantly smaller number of accelerated students who have not applied at all than of traditionals and decelerates.

The accelerates are more likely to have applied to graduate school to work for a Master's of a Ph. D. or to have applied to medical school. The traditionals are less likely to have applied to graduate school or to medical school and more likely to have applied to law school, while the decelerates are less likely to have applied to medical school. The tendency of the traditional attender to be more likely to have applied to law school than the accelerate is apparently related to some characteristic other than goal-orientation. The law student has actually only one year less education beyond the baccalaureate than the medical student, and should, therefore, be as interested in shortening his undergraduate education as is the premedical student. In none of these analyses, however, has this been true. In all of these groups, the student who is going to law school tends to be a traditional attender rather than an accelerated attender.

Whether the student applied at the University of Pittsburgh only, at Pittsburgh and elsewhere, or elsewhere only, for admission to a graduate or professional school is also significant, with the accelerated students more likely to apply at Pittsburgh and elsewhere, the traditionals to apply elsewhere only, and the decelerates to apply at Pittsburgh only.

When these students were asked to evaluate the coverage of subject matter and the adjustment of the faculty to the trimester, there was no significant relationship between their replies and the trimesters elapsed to graduation. One interesting and consistent result, however, has been that although more than 50% of those replying feel that the subject matter has been well covered, only 10% feel that the faculty has adjusted very well to the calendar. And twice as many students in all groups feel that the faculty had adjusted rather poorly and has considerable room for improvement as they feel that a considerable amount of the material on which they were tested was not covered in class. As has been noted in earlier studies, although the students seem to be well satisfied with the way the course material is covered, they do not seem to relate this to the adjustment of the faculty to the calendar.

When the students were asked to indicate what they would do in terms of speed of progress through the educational continuum if they were now entering freshmen, compared with what they have done, a larger percentage of the accelerates than would be expected say they would go more slowly, while a smaller percentage than would be expected say they would go at the same or a faster rate. A larger percentage of the traditionals than would be expected say they would go at the same rate and a smaller percentage say they would go more slowly. A larger proportion of decelerates than would be expected feel they would go more quickly and a smaller proportion than would be expected feel they would go more slowly. In fact, only among the traditionals is there a statistically significantly large proportion of students who would take their college work at the same speed.

Comparison of entering freshmen, September 1959, in terms of acceleration

School or division of enrollment is highly significant with far fewer accelerates than would be expected by chance enrolled in Business, Engineering, Pharmacy, and the Social Sciences; and more enrolled in Education and the Natural Sciences. More traditionals are enrolled in Pharmacy and the Social Sciences than would be expected and fewer in Engineering and the Natural Sciences. More decelerates are enrolled in Engineering and fewer in the Natural Sciences than would be expected by chance.

Sex is also significantly related to acceleration, with proportionately fewer males and more females in the accelerate group, and more males and fewer females among the decelerates. The traditionals are distributed as would be expected by chance.

Age is statistically related to acceleration with a larger proportion of students than would be expected by chance graduating at age 21 or younger among the accelerates and a larger proportion than would be expected graduating at 22 and older among the decelerates. An interesting phenomenon in this group, however, is that students 25 and over are distributed about as would be expected by chance. One might assume that the older student would be more likely to complete his baccalaureate work as quickly as possible, but this has not been the case.

With this group, as with the earlier one reported, permanent residence is not statistically significantly related to acceleration, but university residence is, with fewer accelerates living at home and more in the dormitory than would be expected. A smaller proportion of the traditionals live in the dormitories, while a larger proportion live in fraternities or sororities. A larger proportion of decelerates live at home than would be expected.

Cumulative quality point average is again statistically significantly related to acceleration with more accelerates having quality point averages between 3.0 and 4.0, and fewer having quality point averages between 2.0 and 2.5 than would be expected. A larger proportion of traditionals than would be expected have quality point averages between 2.5 and 3.0 and a larger proportion of decelerates, between 2.0 and 2.5.

The source of funds for direct educational expenses is more likely to be family and less likely to be their own work and savings for the accelerates. The exact reverse is true for the decelerates. The traditionals are distributed as might be expected by chance. With this group, the source of finances for living expenses is also significant, with more accelerates obtaining their living expenses from their families and fewer from their own work and savings than would be expected, while more decelerates obtain their funds for living expenses from their own work and savings, and fewer from their family than would be expected. The traditionals are distributed as might be expected by chance.

Attitude toward long-term borrowing shows a significant relationship to acceleration. A statistically significantly small proportion of accelerated students favor long-term borrowing. The traditionals tend to feel neutral about it, and the decelerates tend to favor it. This might reinforce the supposition presented earlier that the decelerate now sees the advantage of completing his education as quickly as possible.

Attitude toward year 'round education, as always, is significantly related to acceleration with larger proportions of accelerated students favoring it, either strongly or moderately, and smaller proportions being neutral, negative, or very negative. The reverse is true for the traditionals. A statistically significantly large proportion of decelerates are negative in their attitudes toward year 'round education, and a smaller proportion than would be expected definitely favor it.

Formal student activities have no significant relationship to acceleration. Informal activities are statistically significant for this group, however. Fewer of the accelerates indicated they have been very active, and more that they have been very inactive than would be expected by chance. More traditionals than would be expected indicated that they were very active, and fewer that they were inactive. The decelerates are distributed as might be expected by chance.

Plans for graduate education are not significant. When asked to what type of graduate program they had applied for admission, however, a significantly large proportion of accelerates had applied to medical school, and a significantly small proportion had not applied for admission to graduate school at all. A significantly large proportion of traditionals had not applied at all, and a significantly small proportion had applied to work for a Master's degree. The decelerates were distributed as might be expected by chance.

The graduate schools to which application had been made were moderately significant. Proportionately more accelerates applied to Pitt and others, more traditionals, to others only, and fewer to Pitt only. Fewer decelerates applied to Pitt only than would be expected by chance.

The students' attitudes toward the coverage of subject matter and faculty adjustment to the trimester calendar were not significantly related to acceleration. This group, however, gave relative judgements similar to those given by other groups, in that fewer than 5% of the respondents felt the subject matter was not well covered at all, and more than 10% of the respondents felt that the faculty had not adjusted well.

When this group was asked to evaluate their satisfaction with the speed at which they had completed their undergraduate work, more accelerates said they would go at the same rate than would be expected by chance, fewer traditionals said they would go at the same rate. Fewer accelerates said they would go faster, and more traditionals said they would go more slowly than would be expected. More of the decelerates tended to feel that they would to more quickly and fewer that they would go more slowly than would be expected.

Comparison of students who graduated with maximum acceleration

These are students who entered in September 1959, 1960, 1961, and graduated in April 1962, 1963, and 1964, respectively. The school in which the degree was earned was statistically significant for this group with more of the students entering September 1959 earning a degree in the Natural Sciences than would be expected by chance, and fewer of the students entering September 1961 earning the degree in Natural Sciences than would be expected by chance. More of the September 1961 entrants earned degrees in Engineering and Mines and the Humanities than would expected. The students entering September 1960 were distributed as would be expected by chance.

These comparisons show very few parameters statistically significant in relation to year of graduation. This confirms findings in other studies when students with the same degree of acceleration were compared with each other.

There is, however, one parameter which has statistical significance -- outcome satisfaction. Those students who completed their work in April 1962, in 2 2/3 years were more likely to have indicated they would continue at the same rate and less likely to indicate that they would go more slowly. Those who finished in April 1963, after 2 2/3 years, were more likely to indicate they would go more slowly. Those who completed in April 1964, were more likely to indicate they would go more quickly, and less likely to indicate they would go at the same rate.

Comparison of traditionals graduating in April 1963 versus traditional graduating in April 1964

This is the first opportunity since the beginning of the trimester calendar to compare two groups of students who completed their work for the bacalaureate in the traditional four-year period. As might be expected with two traditional groups as with the two groups of maximum accelerates, very few of the parameters are statistically significant.

The school or division in which the degree was earned, however, is significant with more of the four-year students who graduated in April 1963 earning the degree in Pharmacy and fewer in the Social Sciences while more of the students graduating in April 1964 earned the degree in Social Sciences and fewer in Education and Pharmacy, than would be expected by chance.

University residence was significant with this group with fewer of the 1963 graduates living in the dormitories and more in sorority and fraternity houses than would be expected and more of the April 1964 graduates living in dormitories and fewer in sorority and fraternity houses than would be expected.

With only two parameters differing for these two groups, it is again apparent that there is a marked homogenity of the students who travel through the educational continuum at the same rate.

Entering freshmen September 1960 -- Accelerates versus traditionals

When all of the students entering September 1960, who have graduated to date are compared, grouping those who graduated in any accelerated pattern, April, August, or December 1963, and comparing them with those who graduated in the traditional pattern April 1964, a relatively large number of parameters show a statistically significant relationship to acceleration.

The school or division in which the degree was earned is significant in relation to trimesters elapsed between matriculation and graduation, with more accelerates earning the degree in Education, Nursing, and the Natural Sciences, and fewer in Business and the Social Sciences than would be expected. More of the traditionals earned the degree in Business, Engineering and Mines, and the Social Sciences, and fewer in Nursing and the Natural Sciences than would be expected.

Sex is statistically related to acceleration with more females and fewer males than would be expected by chance earning the degree in the accelerated pattern and more males and fewer females earning the degree in the traditional pattern.

Cumulative QPA is also statistically related with more of the accelerates earning QPA's between 3.0 and 3.5 and fewer between 2.0 and 2.5 and fewer traditionals earning QPA's between 3.0 and 3.5 and more between 2.0 and 2.5 than would be expected by chance. The source of financing of direct educational expenses is statistically significant with a larger proportion of the accelerates being financed by their family and a smaller proportion by their own work and savings while the pattern of the traditionals is just the reverse.

The attitude of the graduates toward year 'round education again reflects their own performance, with more of the accelerates' being strongly in favor or moderately in favor of year 'round education and fewer of the traditionals being strongly in favor or moderately in favor of year 'round education than would be expected. A larger proportion of traditionals are neutral, negative, or very negative and a smaller proportion of accelerates are neutral, negative or very negative than would be expected.

The type of graduate experience for which the students have applied is statistically significant, with more of the accelerates having applied to medical school and fewer to law school, and fewer of the traditionals having applied to medical school and more to law school than would be expected by chance. What factor is operating to influence the pre-law student to complete his undergraduate work in four years is an unanswered question. It will be interesting to see if this characteristic continues in future studies.

Although there is no statistically significant relationship between acceleration and either the coverage of subject matter or the adjustment of the faculty to the calendar, both the accelerates and the traditionals are almost twice as likely to feel that the faculty have failed to adjust well to the calendar as that they have failed to cover the course material properly.

Outcome satisfactions as expressed in attitude toward repeating the educational experience are statistically significant with a smaller proportion of the accelerates indicating they would go at the same rate and a larger percentage indicating they will go more slowly than would be expected. A larger proportion of the traditionals indicate they would go at the same rate or more quickly and a smaller proportion indicate that they would go more slowly than would be expected.

Summary

Certain characteristics and attitudes have been statistically related to trimesters elapsed between matriculation and graduation in all comparisons of the groups completing work for the degree since April 1962.

A larger proportion than would be expected of accelerates in every group earn the degree in Education or the Natural Sciences and in two of three groups in Nursing. Proportionately, more traditionals earn the degree in one of the Social Sciences. The two groups of decelerates studied thus far have tended to be enrolled in Engineering and Mines.

In every group, proportionately more women than men are accelerates. Accelerates are more likely to earn QPA's between 3.0 and 4.0; traditionals 2.5 to 3.0; and decelerates, 2.0 to 2.5 than would be expected by chance.

Accelerates are more likely to obtain the funds for their direct educational expenses from parents or relatives, and traditionals and decelerates from their own work and savings than would be expected by chance. Accelerates tend to be negative toward long-term borrowing to finance educational expenses, traditionals, to be neutral, and decelerates, to favor it.

Student's attitudes toward the calendar reflect their own behavior, with those who accelerated favoring year 'round education and those who progressed at the traditional or a decelerated rate not favoring it.

When students are asked to what kinds of graduate programs they have applied for admission, the accelerate is more likely to have applied to medical school and less likely not to have applied for admission to any post-baccalaureate program.

STUDENT QUESTIONNAIRE

Blocks 1 - 20 Please print your name on the answer sheet provided. Enter your last name first, then your first and middle initials-- skip one block between your name and initials. For example, suppose George William Allenfield were filling out the questionnaire. His name would appear on the answer sheet as:

A	L	L	E	N	F	I	E	L	D		G	E	O	R	G	E		W	I

Directions: Enter in the appropriate block provided on the answer sheet the number of the answer which best applies to you. Only one choice is to be entered in the answer block for each question. If you are unable or unwilling to answer, or the question is not applicable to you, place the NUMBER ZERO (0) in the block. Please read the complete question before making your selection. All individual information will be considered confidential.

Block 21 You are earning your degree in: (1) Business Administration; (2) Education; (3) Engineering and Mines; (4) Pharmacy; (5) Nursing; (6) Humanities; (7) Natural Sciences; (8) Social Sciences.

Block 22 Are you an early admit? (1) yes; (2) no.

Block 23 Your sex is: (1) male; (2) female.

Block 24 Regardless of credit load in any trimester, how many trimesters were you in attendance at the University of Pittsburgh? (1) 7; (2) 8; (3) 9; (4) 10; (5) 11; (6) 12; (7) 13; (8) 14; (9) more than 14.

Block 25 Your age in years to your nearest birthday is: (1) under 18; (2) 18; (3) 19; (4) 20; (5) 21; (6) 22; (7) 23; (8) 24; (9) 25 or older.

Block 26 Your permanent residence is in: (If you are single, give residence of parents or guardians; if married, residence of you and your spouse) (1) Pittsburgh; (2) Allegheny County, other than Pittsburgh; (3) Pennsylvania, other than Allegheny County; (4) Ohio; (5) West Virginia; (6) state other than Pennsylvania, Ohio, or West Virginia; (7) country other than U.S.A.

Block 27 While in attendance at the University, you live: (1) at your permanent residence; (2) at a University dormitory; (3) at a fraternity or sorority house; (4) at a sorority suite; (5) at a rooming house; (6) with relatives or friends of the family; (7) other.

Block 28 Your cumulative quality point average is: (1) 3.5 to 4.0; (2) 3.0 to 3.5; (3) 2.5 to 3.0; (4) 2.0 to 2.5; (5) 1.5 to 2.0; (6) 1.0 to 1.5; (7) 0.5 to 1.0; (8) 0.0 to 0.5.

Block 29 The highest educational level attained by your father is: (1) Ph.D. degree; (2) graduate school, master's degree or less; (3) professional degree (LLB, DDS, MD, BD, etc.); (4) BA, BS, or BBA degree; (5) some college, did not graduate; (6) trade, technical, business school; (7) high school graduate; (8) some high school, did not graduate; (9) eighth grade or less.

Block 30 The primary and regular occupation of the chief supporter of your family is: (1) professional (doctor, dentist, lawyer, engineer, accountant, teacher); (2) semiprofessional (medical or dental technician, draftsman, bookkeeper, nurse); (3) managerial or public official (corporation officer, office manager, senator, justice of the peace, foreman); (4) clerical (secretary, bank clerk, other clerical); (5) salesman; (6) service work (bus driver, beautician, shoemaker, policeman); (7) craftsman or skilled labor (carpenter, mason, machinist, printer, automotive mechanic); (8) semiskilled or unskilled labor (steel worker, truck driver, miner, farmer, construction machine operator, gardener).

Block 31 The annual income of your family, including yourself is: (1) under $2,999 (2) $3,000 to $5,999; (3) $6,000 to $8,999; (4) $9,000 to $11,999; (5) $12,000 to $14,999;(6) $15,000 or more.

Block 32 The primary source of funds to finance your direct educational expenses (tuition, fees, and books) is: (1) parents-relatives; (2) scholarship; (3) fellowship; (4) special aid; (5) grant-in-aid; (6) loans; (7) own work or savings.

Block 33 The primary source of funds to finance your living expenses while pursuing your education is: (1) parents-relatives; (2) fellowship; (3) special aid; (4) grant-in-aid; (5) loans; (6) own work or savings.

Block 34 Your attitude toward long-term borrowing (from bank, government, etc.) as a means of financing one's higher education can best be described as: (1) highly favorable; (2) moderately favorable; (3) neither favorable nor unfavorable; (4) moderately unfavorable; (5) highly unfavorable.

Block 35 For the greater part of your college career, you have been employed on an average of the following number of hours per week: (1) 1 to 5; (2) 6 to 10; (3) 7 to 15; (4) 16 to 20; (5) 21 to 25; (6) 26 to 30; (7) 31 to 35; (8) 36 to 40; (9) more than 40.

Block 36 Your attitude toward continuing your education through eleven months of the year can best be described as: (1) highly favorable; (2) moderately favorable; (3) neither favorable nor unfavorable; (4) moderately unfavorable; (5) highly unfavorable.

Block 37 Your participation in formal student activities (student government, clubs, etc.) has been: (1) very active; (2) active; (3) rather inactive; (4) zero.

Block 38 Your participation in informal social activities (dating, sports, hobbies, etc.) has been: (1) very active; (2) active; (3) rather inactive; (4) zero.

Block 39	Your plans to continue your education to obtain a graduate or post-baccalaureate professional degree are: (1) definitely yes; (2) probably yes; (3) undecided; (4) probably no; (5) definitely no.
Block 40	You have applied for admission to: (1) graduate school to work for the master's degree; (2) graduate school and plan to continue through the doctorate; (3) medical school; (4) dental school; (5) law school; (6) theological seminary; (7) other.
Block 41	You have applied: (1) only at the University of Pittsburgh; (2) at the University of Pittsburgh and other institutions; (3) not at the University of Pittsburgh but at other institutions.
Block 42	You (1) have; (2) have not applied for (or been accepted for) a full-time permanent position.
Block 43	To what extent was the subject matter for which you were held responsible on tests covered in the lecture, discussion, and laboratory sessions of your classes? In answering this question, consider the majority of your courses during the past trimesters. (1) all or most of the subject matter was covered adequately in class; (2) some of the course work at the end of the trimester was not adequately covered in class; (3) a considerable amount of the material on which you were tested was not covered in class.
Block 44	In general, you feel that the faculty has adjusted to the trimester calendar: (1) extremely well; (2) quite well, but there is still room for improvement; (3) rather poorly, with considerable room for improvement; (4) not at all.
Block 45	If you were entering college now, you: (1) would complete your work as you have done; (2) complete your work more quickly; (3) complete your work more slowly; (4) other.
Block 46	Please give the month and year in which you entered the University of Pittsburgh.
Block 47	Please give a summary opinion of the trimester calendar.
Block 56	The number of credits you have earned at the University of Pittsburgh is: (1) 120-130; (2) 131-141; (3) 142-152; (4) 153-163; (5) 164 or more.
Block 57	Did you change your major after earning more than 60 credits toward your degree? (1) yes; (2) no.

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EASTERN MICHIGAN UNIVERSITY

Current emphasis upon college graduation as a prerequisite for the more desirable occupational positions, together with a highly mobile population and the rapid proliferation of community colleges, have combined to swell the ranks of the transfer students. Eastern Michigan University (EMU), situated at the edge of the populous Detroit metropolitan area within daily commuting distance of five established community colleges (at least three more are in various stages of organization), two of Michigan's major public universities, its largest private university, and a number of private and proprietary schools, is literally besieged by transfer applicants. As a result, EMU has adopted standards for transfer admission intended to assure the selection of transfers who can compete effectively with returning native students.

Recent literature on transfer students indicates a primary concern with the success of community college (or, if one prefers, junior college) students transferring to four-year institutions. Masiko (1957) reported no appreciable change in cumulative GPA for graduates of the Wright campus of Chicago Junior College who transferred to Chicago area schools. Florida State University (1958, 1959) and Florida's Board of Control (1960, 1961, 1964) report a first-semester "GPA shock" for Florida junior college students transferring to Florida public universities, followed by recovery to a performance level approximating the junior college GPA, and Lambe (1964) reports a similar finding at Western Michigan University. Holmes (1961) at Syracuse University and Klitzke (1961) at Colorado State College found that junior college transfers did not do as well as native students. Knoell (no date) summarized reports from 43 institutions (including branches) in ten states, and reported that with one exception (EMU !), junior college transfers experienced some degree of "GPA shock" in their first semester. Whether or not they made an appreciable recovery varied from school to school. Holmes also included experience with transfers from four-year institutions. Of the studies cited, only Klitzke attempted to control closely some of the variables (sex, curriculum, etc.) that might reasonably be expected to affect the relative performance of transfers and native students.

Hills (1965a), after an exhaustive study of the literature on junior college transfers, concluded that "GPA shock" is generally found and (1965b) recommends that in the absence of local data, pre-transfer GPAs of 2.3 and 2.7 be required prior to transfer from four-year colleges and junior colleges respectively.

A reasonable inference would then be, that the relative success of transfer students depends less upon the fact of transfer than upon the admission policy for transfers and the degree of congruence between the grading practices of the receiving and sending institutions.

In the present study, the sample selected was composed of all transfers (N = 1103) entering EMU during the Fall of 1962, Spring and Fall of 1963, and Spring of 1964, who had taken at least 12 hours in another institution and who took at least 12 hours in their first semester at EMU. Since EMU admission policies apply equally to students from all accredited schools, students with transfer records at two or more schools were included, and were counted as having transferred from their last school of regular attendance. An attempt was made to match each of these 1103 persons with a native student for the same semester, matching on sex, curriculum, major field, hours completed with a tolerance of five hours (except that if the transfer student had completed 60 or more hours, a tolerance of ten hours was permitted), and GPA with a permissible tolerance of .30, but with an effort made to match within .10 on GPA. It was possible to match a total of 569 of the 1103 transfers against comparable native students based on these criteria.

The present report is concerned primarily with the initial phase of the study which involves the first semester academic performance of the transfer students. Subsequent phases of the study will involve the cumulative performance, the persistence, and the graduation rate of the transfers and their native matches.

Findings

As indicated in Table 1, when matched on sex, curriculum, major, hours, and previous GPA, the transfers had a mean criterion GPA of 2.5365 as compared to 2.4495 for the native students. The mean difference was small (.0870), but significant at the 1% level based on a t-test of differences between correlated means. However, exclusion of the 43 students transferring from a single highly selective school would drop the mean difference to a non-significant .0368 in favor of the transfers. Significant mean differences were found between transfers and matched native students from one community college, two public four-year institutions, and for all non-Michigan schools (see Table 1). Of these differences, all but one (a public four-year institution) favored the transfer students. Community college transfers performed at the level of the total transfer group, and exactly matched the mean performance of their native counterparts.

The honor roll (3.0 or better) was reached by 28.3% of the total matched transfers and 20.2% of their native counterparts, while 15.5% of the transfers and 16.5% of the natives earned less than a 2.0 GPA. In the matched community college group, 27.0% of the transfers and 23.4% of the matched natives made the honor roll, while 12.8% of the transfers and 15.0% of the natives made less than 2.0.

Interpretation of findings

The findings that transfer students in their first semester at EMU are somewhat more successful that matched native students raises the question of why so many schools report a contrary experience. This is especially true with regard to the community college students who have been so frequently reported to experience a "GPA shock" during their first semester on the four-year campus.

The unusual success of transfers in general and community college transfers in particular at EMU is probably attributable to the EMU policy on transfer admission. This policy is based upon the assumption that grades earned at other accredited schools are comparable to grades the student would have earned had he attended EMU. While the data (e.g., see four-year colleges 32 and 36 in Table 1) clearly indicate differences in grading practices between

Table 1

Relative First Semester Performance of Matched Transfer and Native Students at Eastern Michigan University (By College of Origin when $N \geq 10$)

	College of Origin	N	Transfer Mean	Native Mean	Transfer SD	Native SD	Diff. (N-T)	t	D.F.	Sig.
Public Community Colleges	4	30	2.46	2.63	.67	.46	.17	1.34	29	ns
	7	76	2.59	2.52	.55	.52	-.07	.42	75	ns
	8	24	2.59	2.48	.65	.53	-.11	.64	23	ns
	9	20	2.45	2.37	.55	.66	-.08	.71	19	ns
	12	36	2.81	2.51	.59	.69	-.30	2.39	35	05
Public 4-Year Institutions	30	12	2.40	2.02	.49	.59	-.38	1.88	11	ns
	32	14	1.89	2.52	.46	.57	.63	2.95	13	05
	34	17	2.72	2.69	.56	.54	-.03	.17	16	ns
	35	10	1.93	2.52	.85	.57	.54	1.46	9	ns
	36	43	2.95	2.25	.48	.72	-.70	4.23	42	01
	37	18	2.65	2.50	.70	.62	-.15	1.01	17	ns
	38	17	2.42	2.28	.59	.74	-.14	.68	16	ns
Private 4-Year Institutions	50	12	1.97	2.18	.71	.63	.21	1.03	11	ns
	84	21	2.38+	2.38-	.73	.69	.01	.03	20	ns
All Non-Michigan	98	81	2.61	2.43	.67	.60	-.18	2.06	80	.05
Total Matched Community College Sample		226	2.54	2.54	.60	.57	.00	.00	225	ns
Total Matched Sample		569	2.54	2.45	.64	.62	-.09	2.64	568	.01

individual schools, a comparison of the records of matched natives and transfers suggests that EMU grading practices correspond well with the average grading practices at our sending institutions. The available data do not warrant separate EMU admission policies for transfers from community colleges as opposed to four-year colleges.

Although Hills offers a GPA rule-of-thumb for admitting transfer students, he makes it clear that this should be only a temporary substitute for local data. The present study indicates that this rule-of-thumb would be unnecessarily strict for EMU. Others might find it too lenient.

At EMU, admission on record is granted to transfer students with a cumulative GPA of 2.0 or better, based on at least 12 hours from an accredited institution. In computing GPA, all academic grades of A through E are counted, including repeats, on a scale where A = 4, etc. Students having the required 12 hours at an accredited institution, but lacking the required 2.0 GPA may qualify after testing if their test composite places them in the upper half of admitted transfer students. In practice, very few students are admitted via testing with a deficit of more than 12 honor points.[1] Students with less than 12 hours from an accredited institution must qualify on the same basis as a first-time student.

The net effect of these admission regulations is to admit a transfer student of demonstrated ability who should be able to compete effectively with surviving native students. It would seem reasonable, then, to attribute the relative success of transfer students at EMU primarily to the realistic nature of the transfer admission policies.

The data from this study, supported by Knoell's data showing varying success patterns for junior college transfers to various four-year institutions, suggest that "GPA shock" (or "transfer shock") may be largely explained by more rigorous grading practices in the receiving institutions. Where there is substantial congruity, little or no "GPA shock" would be expected. In cases where the sending institution grades more rigorously, "GPA relief" might be experienced and post-transfer grades would be higher.

Conclusions

1. The transfer admission policy at Eastern Michigan University results in the selection of transfer students who can compete on equal terms during their first semester on campus with matched native students.

2. The available evidence suggests that the "GPA shock" phenomenon primarily reflects differences in the grading practices of the sending and receiving institutions.

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[1] Honor points are calculated by multiplying the numerical value of the letter grade by the hours of credit for that course. To be in good academic standing, a student must have at least twice as many honor points as he has hours attempted.

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During the last two decades there has been an increased interest in the improvement of higher education in America. Within the colleges and universities, self-examination and evaluation in many areas have been taking place, especially with regard to how students change during the time they spend within the college community. For the most part the major concern prior to 1956 was the intellectual development of these students, but more recently there has been a growing concern with the development of personality, attitudes, and values of those who have spent four years in a college atmosphere.

According to Sanford (1956), as late as 1956 no thorough studies of colleges or universities as social systems had been made. Although several studies have been completed since that time, many are of limited value since they are subject to methodological criticism. Donald R. Brown has summarized the more comprehensive studies in "personality, college environment, and academic productivity" as follows:

> Fortunately, a number of large-scale studies have begun to emerge in which comparative samples of many types of colleges and types of students are being studied with standard instruments. The intensive study of one group of students at one institution, such as Sarah Lawrence, at Yale by Wedge, et al. (1958), by Heath at Princeton (1958), and Sanford, et al. at Vassar, to mention a few are invaluable in explaining the relevant parameters and in giving a sense of the richness of the data, but ultimately the insights gained must be tested in a world which . . . is "ecologically representational and valid." Only then can one safely generalize beyond single institutions and particular samples of students.

Up to this time little data has been collected in the South or Southwest relative to student change during a college career. A new administration at Baylor University in 1959 encouraged any and all projects which would aid in evaluating, improving, and contemporizing the University. A study of the characteristics of the students and the impact of the unique environment of Baylor on these students was seen to be one which would contribute both to the needs of the University and to an extension of research already begun in this area.

In 1960 a proposal was made to the Hogg Foundation of Texas to study the 1961 freshmen at Baylor University. Grants from this foundation made the first two years of the study possible. During the year of 1961 a battery of inventories, tests, and a biographical questionnaire were completed by 497 men and 559 women, who were less than twenty years of age, who had registered for at least twelve semester hours, and who had less than twelve semesters hours credit before September 1961. In 1962-1963, many of the original and several new instruments were administered to the 385 men and 414 women who had returned for their second year; this represented 77 per cent of the men and 74 per cent of the women tested the first year. During 1963-1964 no tests were administered, but in the 1964-1965 school year, four of the original tests, a new biographical questionnaire, and the Graduate Record Examination were administered to 203 men and 238 women.

First to be considered in this report is the College Characteristics Analysis developed by C. Robert Pace and used as the device for evaluating the dynamics of the college environment. Of this instrument he says,

> In a complex college or university there are many environments. The first purpose of the College Characteristics Analysis is to enable students to report what, in their experience and opinion, is or is not true about the particular part of the university they know best. The content of the items in the CCA is organized along two dimensions.

The first dimension is divided into the four emphases shown in the following:

Table 1 - Intellectual, Humanistic, Aesthetic Emphases

Table 2 - Friendly Group-Welfare Emphases

Table 3 - Independent Scientific Emphases

Table 4 - Practical Status-Oriented Emphases

The second dimension along which the items are located refers to the three major parts of the college community: the administrative community with its rules, procedures, and facilities; the academic community which refers to the faculty and to the curriculum; and the student community "which refers to student characteristics, extra-curricular programs, and informal student activities."

Table 1 summarizes the Intellectual, Humanistic, Aesthetic Emphases on various campuses. It should be noted that colleges 1-3 are private schools, 4 and 5 are denominational schools, and 6-9 are state schools. It may be observed that the students in the private schools and in the denominational schools tend to feel more emphases in this area than do the students at state schools and at Baylor. Table 2 shows that students in demoninational schools feel more emphases in the Friendly Group-Welfare Area. Table 3 shows that students in private schools feel more emphases in the Independent Scientific Area. Table 4 shows that students in state schools and in Baylor feel more emphases in the Practical Status-Oriented Area. It is interesting to note that Baylor Women feel more emphases in this area than do students in any of the other nine schools. Not only do Baylor students see the administration as practical and status-oriented, but they also see the faculty as having a little more of these emphases. They see other students as having status-orientation. Tables 1-4 give an overview of the environment in which the 1961 freshmen found themselves.

Table 5 is a summary of most of the test results obtained from the 1961-1962 test battery. The results of the California Psychological Inventory are more meaningful when compared with the norms in Table 6. The Survey of Opinion is a Hogg Foundation development with no norms other than Baylor's, but it is useful to measure changes in this group. The results of the Allport-Vernon-Lindzey Study of Values is in Table 5b. This group of Baylor students was used as the norm group for the Texas Interest Analyzer and the Bible Knowledge Test. Norms for the Omnibus Personality Inventory are continually changing due to current research. The last data is from the American College Test which has an approximate mean of twenty on each scale for collegebound students. Several findings not in Table 5 are: women were significantly higher in their rank in high school classes than were the men, women made better grades in freshman English and men made better grades in social studies.

Based on those who returned in 1962, it was determined that men who dropped out had rated themselves as being lower on the following CPI scales: dominance, responsibility, self-control, good impression, achievement via conformance, and intellectual efficiency than had those who returned for a second year. The men who returned had rated themselves as being lower on sociability, flexibility, and capacity for status.

The women who dropped out had rated themselves lower on femininity, responsibility, socialization, self-control, tolerance, good impression, and achievement via conformance than did those who returned for a second year. Those who returned rated themselves as being lower on dominance, sociability, social presence, self-acceptance, achievement via independence, and intellectual efficiency.

The tests administered during the senior year have been partially scored, but the Graduate Record Examination results are not back from the Educational Testing Service. A sample of the data on the California Psychological Inventory and the Survey of Opinion has been analyzed tentatively with results as indicated in Tables 6 and 7. Actually, the results in Table 6 are for graphs showing the means on each of the 18 scales of the CPI for freshmen, sophomores, and seniors, while the data in Table 7 shows the significance of these differences.

Table 6 shows that on 14 of the 18 scales the sophomore men scored higher (and supposedly indicated greater maturity) than the same students did as freshmen. The senior men showed a rising trend on the seventh, twelfth, and eighteenth scales. One of these seniors said last week, "Those of us who returned for our sophomore year of college felt grossly self-confident, and two years later we returned aware that we didn't know it all." The lower half of Table 6 reveals that on each annual testing, the women tended to increase on seven of the CPI scales, to decrease on feminity, and to score lower as sophomores on the remaining ten scales. As has been found in other studies, continued education is correlated with men becoming more sensitive and women less sensitive and less feminine.

While time does not permit detailed consideration of the results of the factor analysis of the freshman battery, it is reassuring that the results from the CPI data are similar to those obtained on other classes in other institutions.

Table 8 shows the means on the 1961 and 1964 Survey of Opinion, and the level of signifigance of the changes for the same students are reported on the lower half of Table 7. Of the 203 men and 238 women who completed the Survey of Opinion in their freshman and senior years, they showed significant decreases in authoritarianism and prejudice. They tended to increase on the orientation to society (0) scale which reflects a more materialistic outlook.

The data from the biographical questionnaire has been only sparcely analyzed. As time and resources are available, further investigation of the data will provide enriched statistical results. It is anticipated that further study will reveal valuable information concerning students who change significantly and those who resist change.

Table 1. Summary of the Composite Mean College Characteristics Analysis Scores, Ten Colleges, on Intellectual, Humanistic, Esthetic Emphases

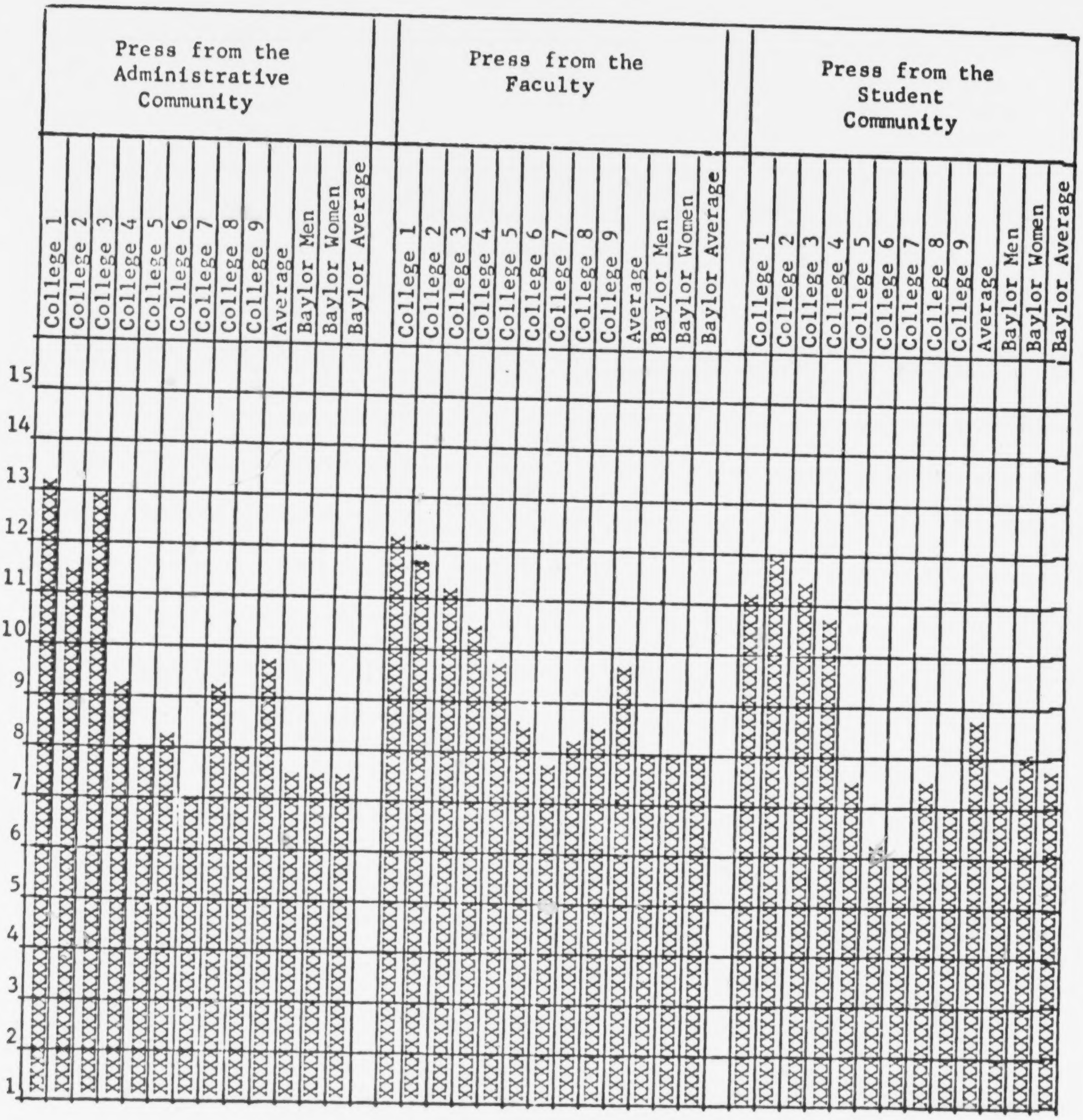


Table 2. Summary of the Composite Mean College Characteristics Analysis Scores, Ten Colleges, on Friendly Group-Welfare Emphases

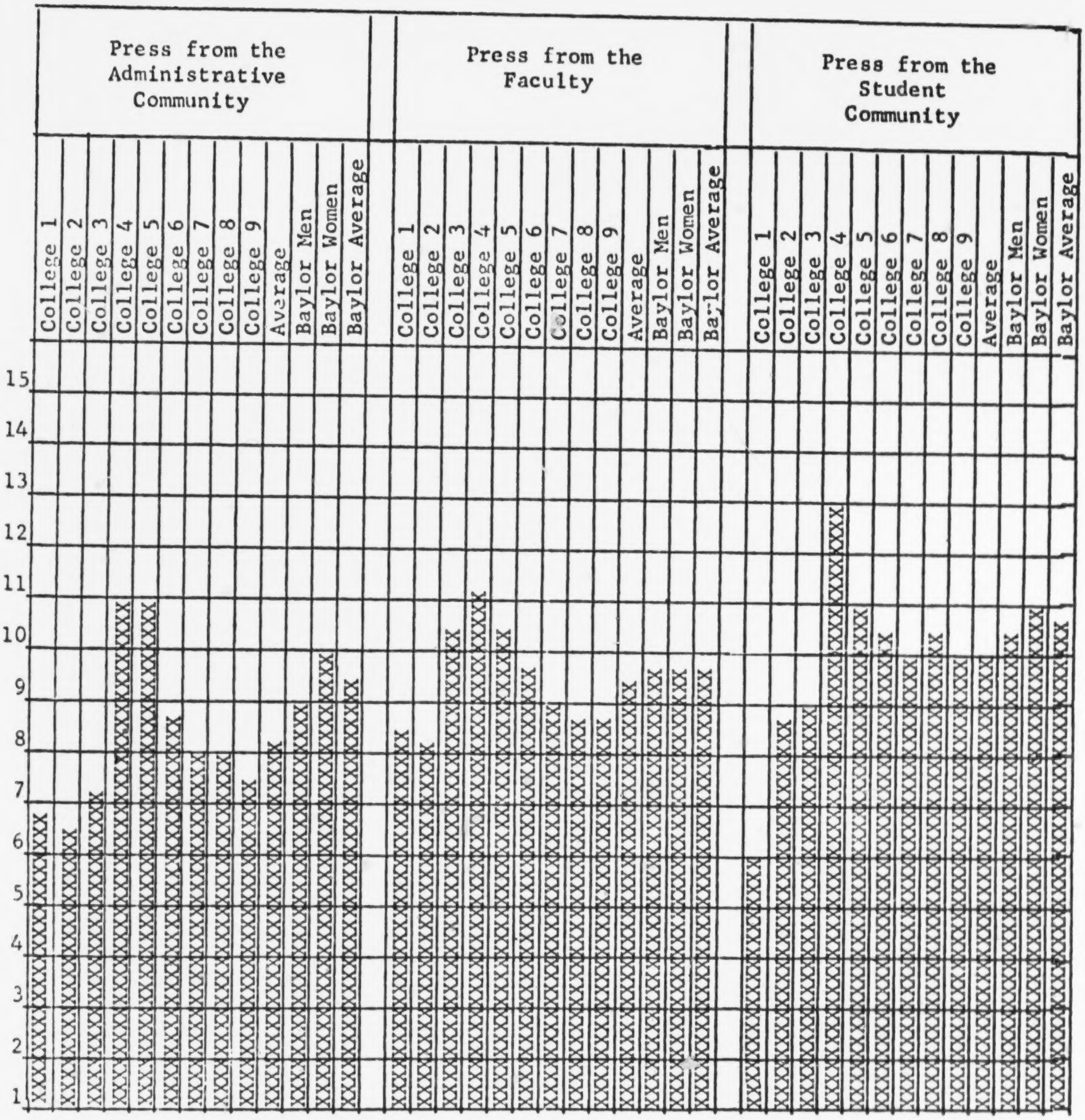


Table 3. Summary of the Composite Mean College Characteristics Analysis Scores, Ten Colleges, on Independent Scientific Emphases

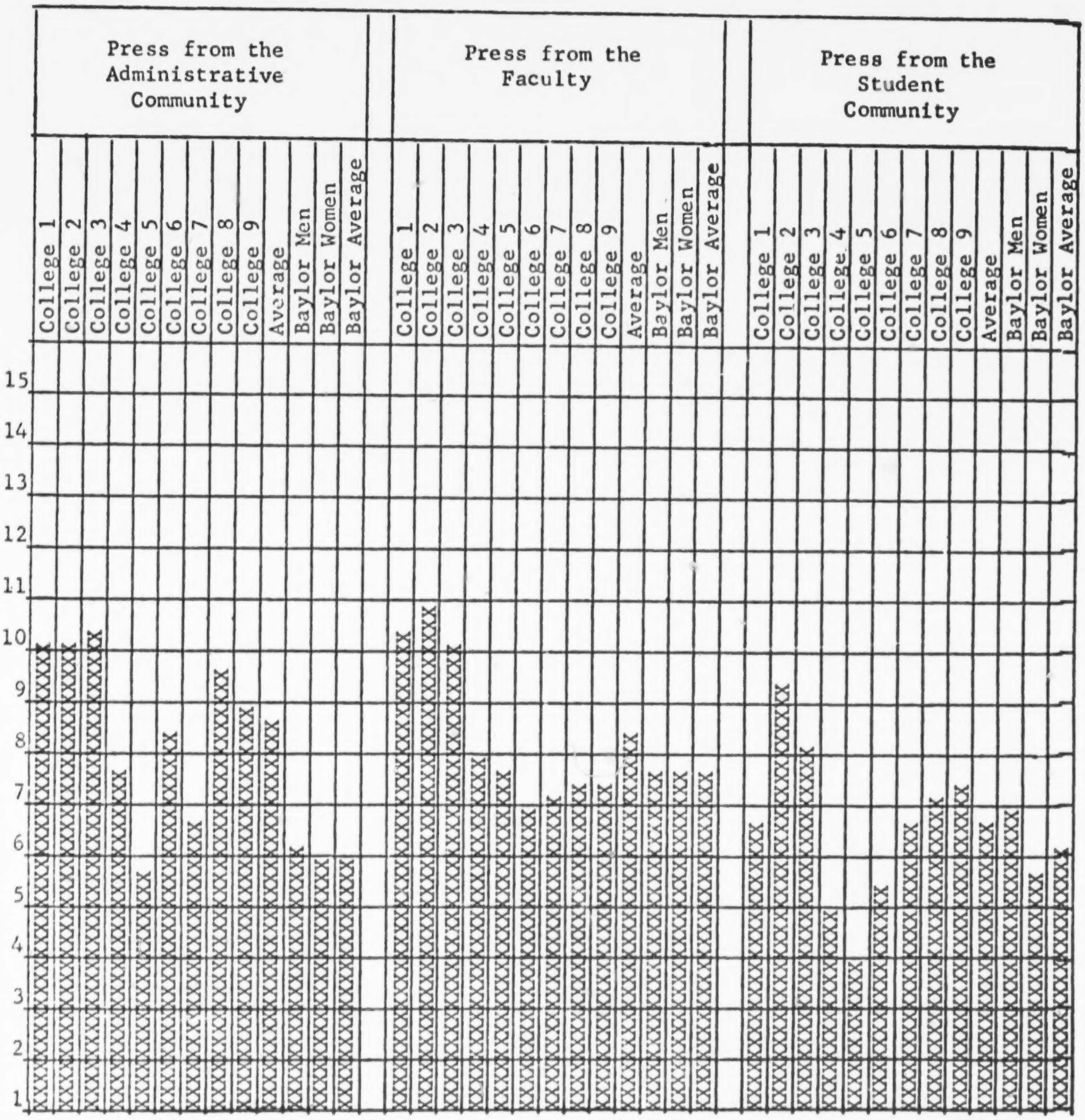


Table 4. Summary of the Composite Mean College Characteristics Analysis Scores, Ten Colleges, on Practical Status-Oriented Emphases

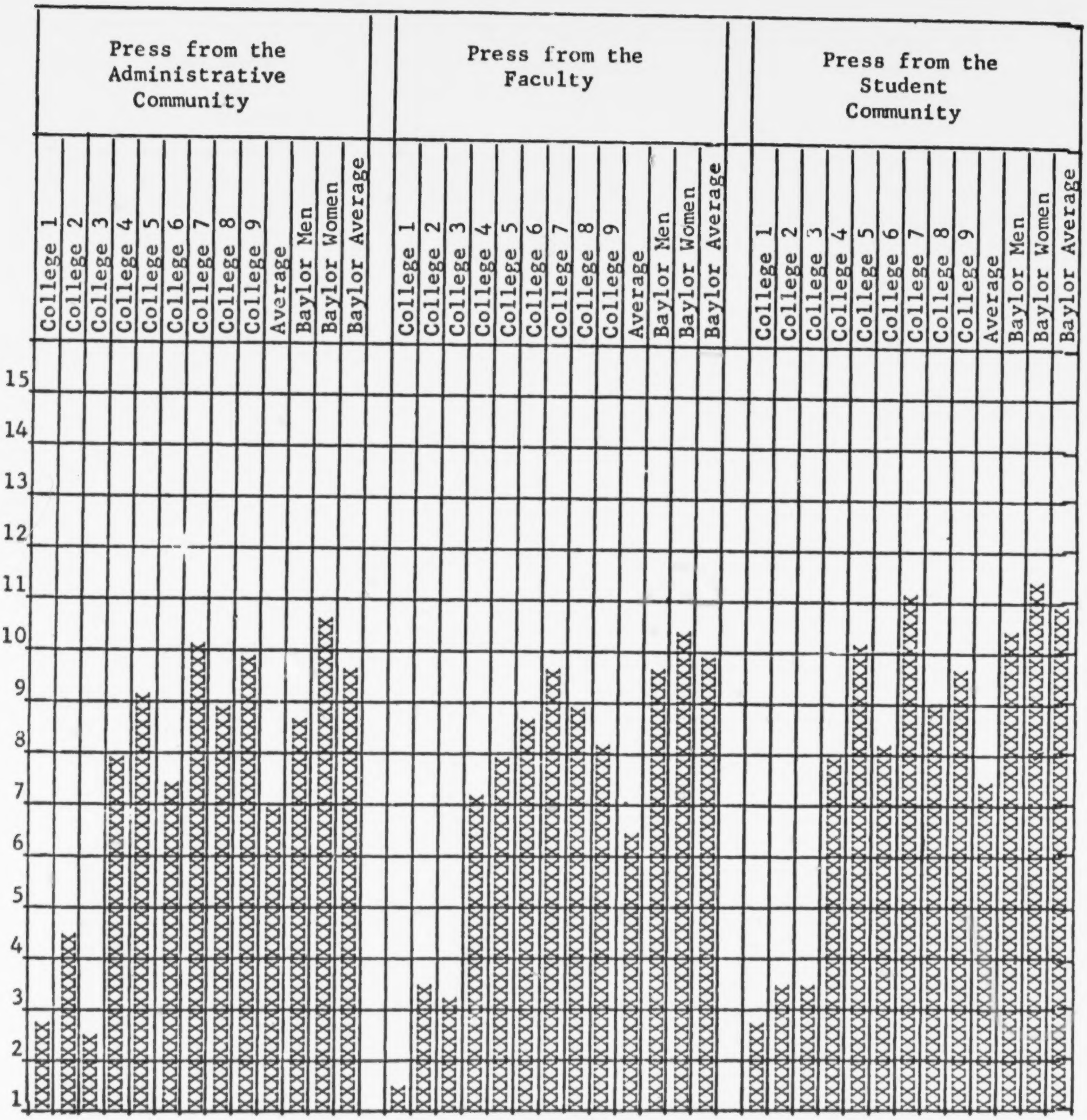


Table 5a

MEANS FOR 1961 FRESHMAN
BAYLOR UNIVERSITY, WACO, TEXAS

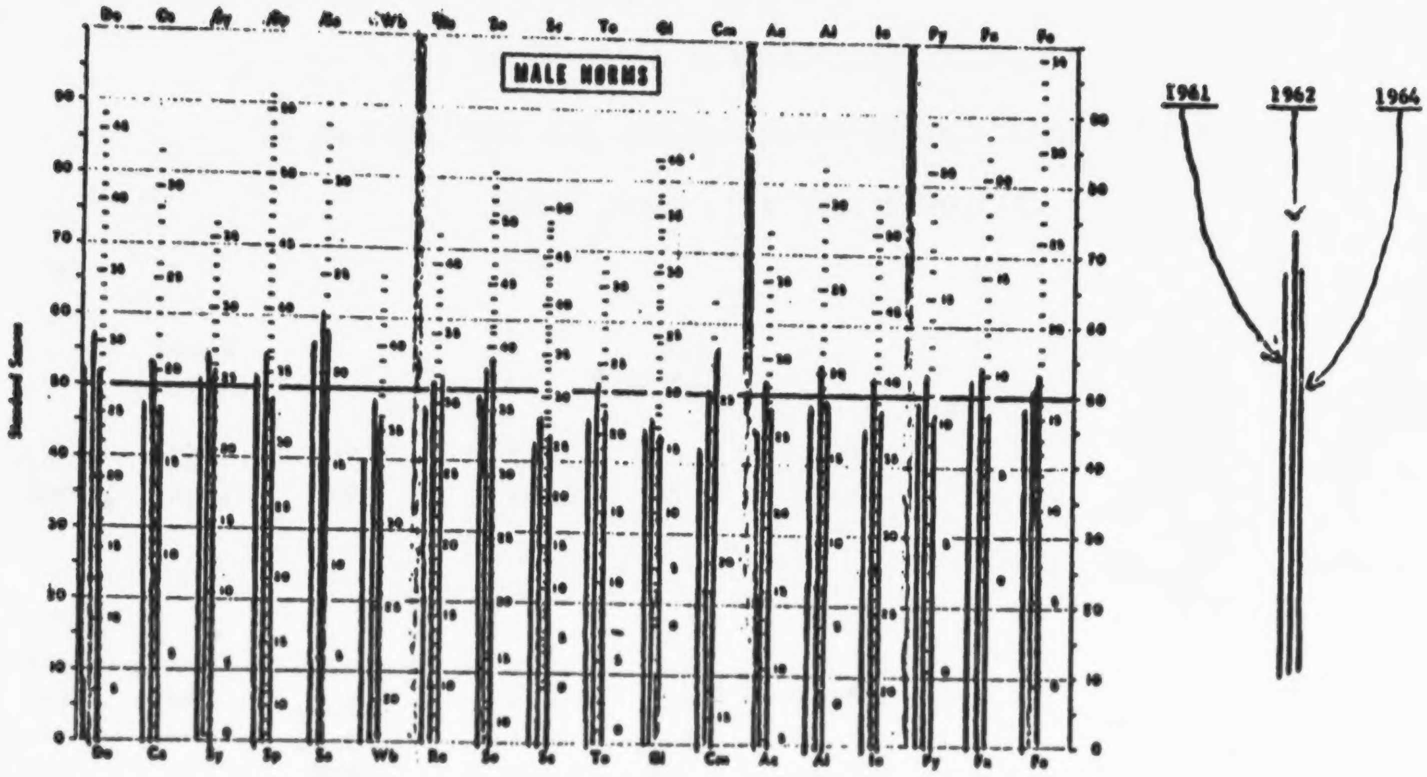
	Men (N-497)	Women (N=559)
CALIFORNIA PSYCHOLOGICAL INVENTORY		
Dominance	27.88	27.80
Capacity for status	18.57	18.98
Sociability	25.10	24.09
Social presence	33.78	31.45
Self-acceptance	21.95	21.67
Sense of well-being	35.44	35.25
Responsibility	30.92	33.24
Socialization	38.27	41.17
Self-control	25.73	27.98
Tolerance	21.57	22.18
Good impression	16.37	16.49
Communality	25.85	26.41
Ach. via conformance	26.26	27.37
Ach. via independence	18.30	18.92
Intellectual efficiency	37.74	37.99
Psychological-mindedness	10.28	9.99
Flexibility	8.56	8.46
Femininity	16.01	24.15
SURVEY OF OPINION		
Dogmatism	83.06	83.64
Intolerance of the Negro	62.21	62.30
Conservatism	33.89	33.10
Religious fundamentalism	48.69	51.77
Orientation to society	20.42	18.75
GRADE POINT AVERAGE	2.08	2.23
DATE TESTS TAKEN	1.63	1.08
SOCIO-ECONOMIC INDEX	41.46	40.76

Table 5b

MEANS FOR 1961 FRESHMEN
BAYLOR UNIVERSITY, WACO, TEXAS

	Men (N=497)	Women (N=559)
STUDY OF VALUES		
Theoretical	41.76	35.51
Economic	40.67	36.31
Aesthetic	32.77	38.41
Social	36.19	39.91
Political	42.05	37.65
Religious	46.52	52.20
TEXAS INTEREST ANALYZER		
Theoretical	25.42	22.09
Economic	21.40	17.73
Aesthetic	19.39	24.44
Social	19.93	22.56
Political	25.47	24.29
Religious-conservative	23.52	26.77
Religious-liberal	23.77	26.50
BIBLE KNOWLEDGE		
Old Testament	27.54	30.39
New Testament	39.26	44.68
OMNIBUS PERSONALITY INVENTORY		
Social Maturity	67.55	63.59
Thinking Introversion	28.79	28.66
Impulse Expression	28.28	21.67
Developmental Status	21.95	17.80
AMERICAN COLLEGE TEST		
English	20.54	22.51
Math	22.35	18.77
Social Studies	21.89	21.20
Natural Science	22.83	20.96
Composite	22.02	20.97

TABLE 6



PROFILE SHEET FOR THE ***California Psychological Inventory*** **: FEMALE**

Name ______________________ Age ______ Date Tested ______________

Other Information ______________________

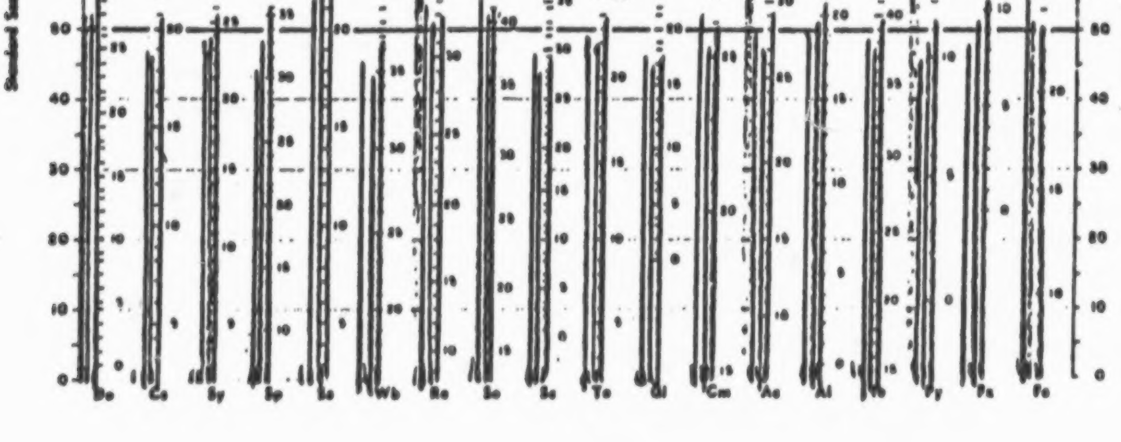


TABLE 7

SIGNIFICANCE OF MEAN DIFFERENCES FOR 1961 FRESHMEN, 1962 SOPHOMORES, AND 1964 SENIORS AT BAYLOR UNIVERSITY, WACO, TEXAS

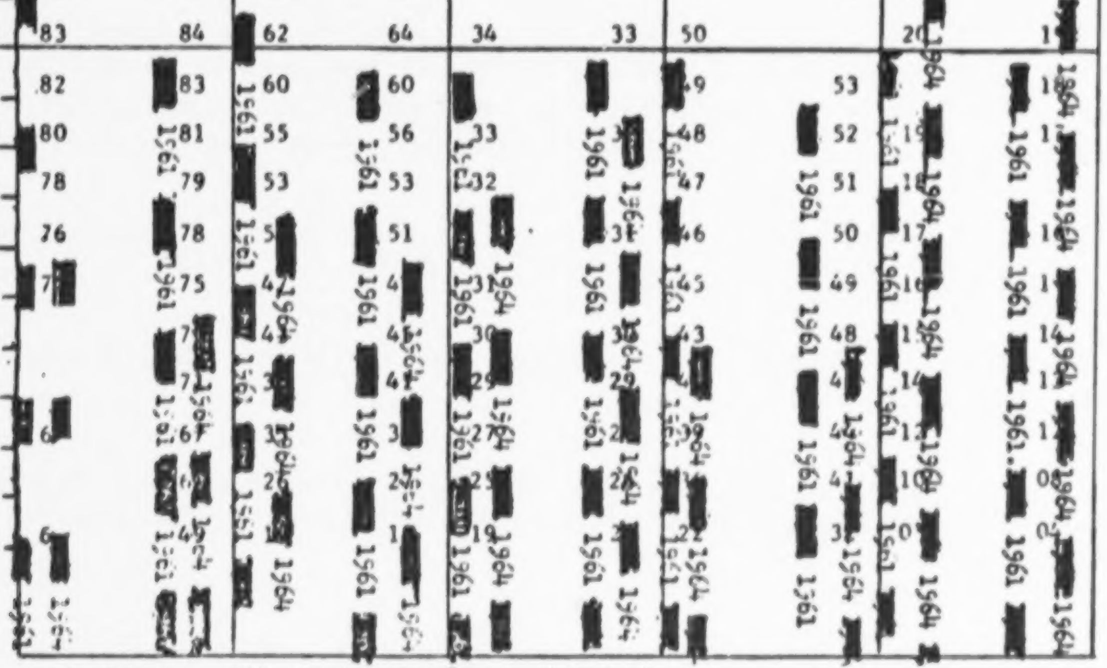
	Men (N=203)			Women (N=238)		
	1961-1962	1961-1964	1962-1964	1961-1962	1961-1964	1962-1964
CALIFORNIA PSYCHOLOGICAL INVENTORY						
Dominance	***	N.S.	***	N.S.	***	***
Capacity for status	***	N.S.	***	N.S.	***	***
Sociability	***	N.S.	***	N.S.	***	***
Social presence	***	**	***	***	***	***
Self-acceptance	***	N.S.	*	N.S.	***	***
Sense of well-being	***	*	*	**	***	***
Responsibility	**	***	N.S.	***	**	**
Socialization	***	***	N.S.	***	**	N.S.
Self-control	***	*	N.S.	**	N.S.	**
Tolerance	***	N.S.	**	N.S.	***	***
Good impression	N.S.	N.S.	*	N.S.	N.S.	N.S.
Communality	***	***	**	***	N.S.	*
Ach. via conformance	***	**	**	N.S.	***	***
Ach. via independence	***	N.S.	***	N.S.	***	**
Intellectual efficiency	***	*	**	*	***	***
Psychological-mindedness	***	*	***	*	***	**
Flexibility	*	**	***	*	***	*
Femininity	*	**	N.S.	**	***	N.S.
SURVEY OF OPINION						
Dogmatism		***			***	
Intolerance of the Negro		***			***	
Conservatism		**			N.S.	
Religious fundamentalism		***			***	
Orientation to society		N.S.			*	

N.S. = No significant difference
*p = .05
**p = .01
***p = .001

TABLE 8

MEANS FOR 1961 FRESHMEN AND 1964 SENIORS ON THE SURVEY OF OPINION

%ile	D		N		C		R		O	
	Male**	Female*	Male	Female	Male	Female	Male	Female	Male	Female
99	116	114	108	112	48	44	60	60	38	38
95	105	108	99	98	43	41	58	59	31	29
90	100	101	101	91	41	40	57	58	29	26
85	97	97	86	85	40	38	56	57	27	25
80	94	94	82	81	38	37	55	56	26	24
75	91	92	78	77	37	36	54	56	25	23
70	90	90	74	73		35	53		24	22
65	88	89	71	70	36			55	23	21
60	87	87	68	68	35	34	52		22	20
55	85	85	65	65			51	54	[illegible]	
50	83	84	62	64	34	33	50		[illegible]	[illegible]
45	82	83	60	60			[illegible]	53		[illegible]
40	80	81	55	56	33	[illegible]	48	52	[illegible]	[illegible]
35	78	79	53	53	32		47	51	18	
30	76	78	[illegible]	51		[illegible]	46	50	17	[illegible]
25	[illegible]	75	[illegible]	[illegible]	[illegible]		45	49	16	[illegible]
20		[illegible]	[illegible]	[illegible]	30	[illegible]	43	48	15	14
15		[illegible]	[illegible]	[illegible]	29	[illegible]	[illegible]	[illegible]	14	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
05		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10	08
01	[illegible]	[illegible]	[illegible]	[illegible]	19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]



** Based on 1961 Baylor Freshmen (497 Men)
* Based on 1961 Baylor Freshmen. (559 Women)

Graphs are based on 203 senior men and 238 senior women.

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PART V

SPECIAL TOPICS

Problems in Data Collection

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Problems in Data Collection

The purpose of this report is to present an overview of the kinds of problems which have been encountered in the collection of data for the Higher Education Salaries and Higher Education Basic Student Charges surveys during the past five years. Inasmuch as the members of the National Institutional Research Forum (NIRF) have utilized the results of these two surveys, and to some extent have been the sources from which data for these surveys were derived, it was felt that these problems would be of interest to members of this organization.

The need for current up-to-date information on virtually all aspects of college and university operations necessitates the undertaking of annual and periodic surveys by public and private agencies, as well as by individual researchers. To furnish current educational statistics which can be used for decision making by Federal and State higher education officials and by professional and lay publics, the Office of Education has been called upon more and more to act as the collector of educational statistics. The heightened pace of Federal legislation in the higher education field has made the need for reliable and valid data of paramount importance.

This presentation will deal with the following questions:

1. What is the procedure used to initiate a survey of higher education at the national level?

2. What are the mechanics for implementing data collection?

3. What problems does a survey researcher encounter in this endeavor?

Answers to these questions should prove useful to users and suppliers of educational data. It is also hoped that identification of the problems inherent in data collection will ameliorate the data collection process.

The topic to be covered here will be restricted to our experience with the collection of data for the Higher Education Salaries and the Higher Education Basic Student Charges surveys. Since these two surveys were originated in 1957, the annual collection of these data has given the sponsors considerable experience in data collection. Also, the clientele who have supplied data for the surveys have had considerable experience in supplying data. It should be kept in mind that what follows may typify annual surveys rather than biannual or one shot surveys.

Procedure for initiating statistical studies

The Federal Reports Act of 1942 requires Bureau of the Budget clearance of all forms emanating from Federal agencies which request information from 10 or more persons. A brief summary of the steps in obtaining survey clearance are:

1. Sponsor's proposal to do a study

    (a) objectives
    (b) background
    (c) justification

2. Review of proposal with sponsor's unit

    (a) section
    (b) branch
    (c) division
    (d) bureau

3. Appointment of a statistical coordinator from NCES who aids sponsor in

    (a) planning
    (b) developing
    (c) carrying out study

4. Determination of roles of sponsor and coordinator

5. Consultation with professional leaders

6. Formal proposal (including pilot study)

    (a) universe of inquiry
    (b) survey instrument
    (c) table shells

7. Clearance within sponsor's unit

8. Other office clearance (coordinator)

    (a) sampling plan
    (b) forms design
    (c) data processing
    (d) cost of publication

9. Departmental clearance

10. Bureau of the Budget Clearance

11. Printing of forms

Mechanics for implementing data collection

1. Editing instructions

Even before the questionnaire forms are mailed out, the sponsor writes out the instructions needed to edit the returns. With minor modification the instructions for recurring surveys are based on those written in previous years. The instructions include the following checks: internal consistency, external consistency, incomplete or unfilled parts of a report, and items requiring coding or numerical entry. Wherever possible, the editing provides for both manual and mechanical checks.

2. Mailout

Addressograph plates and mailer punch cards are maintained by the Office of Education for addressing forms and envelopes in mail surveys. The mailroom is provided with additions, changes, and drops, which keep the mailing lists current.

The mailroom imprints the name and address of the institution on two survey forms (one is the respondent's file copy) and on the envelope. Because it would be difficult to address the forms to a particular individual by name, the title of the person whose responsibility falls in the purview of the survey is imprinted on the envelope. Mailroom personnel then stuff the envelope with the two copies of the questionnaire and a self-addressed, postage-paid return envelope. With the exception of the forms that require special handling, the forms are then mailed out.

3. Receipt control

To enable the sponsor to know the response flow at any particular time after mailout, a routine system of control of returns is established. A clerical assistant has the responsibility of: (1) stamping the date on returns as they come in, (2) making a list of the returns, and (3) pulling and discarding the follow-up reminder cards from two universe decks. The forms are then sent to a research assistant whose responsibilities include: (1) checking the items of information on the return in a universe log, and (2) making a duplicate copy of any form which has item nonresponse, to be sent back for completion by the person whose name appears on the form.

4. Follow-up of nonrespondents

Prior to survey mailout the sponsor of a survey has two sets of reminder cards imprinted with the institutional name and address, as well as the position title of the official for whom it is intended. By discarding the reminder cards from both universe decks upon receipt of returns, the sponsor is able to mail out reminders to nonrespondents at specified dates, usually one and two months after the initial mailout. For those institutions which require special handling, a letter and reminder card are mailed to the individual coordinating the collection of data.

When the cut-off date for the survey approaches and certain institutional categories do not show an acceptable response rate, other means of contacting the nonrespondents are used. On several occasions we have had the cooperation of professional associations which encourage their nonresponding members to complete the survey forms. In addition, night letters and telephone calls have been used as a means of stimulating nonrespondent activity.

Problems in data collection

This report concerns itself solely with the data-collecting phase of surveys. It does not cover the phases necessary for the completion of the project, including card-punching, programming, machine tabulation, writing, and completing the report. The problems encountered in the data collecting are enumerated below.

1. Extent of coverage

In the first draft of the survey form the sponsor usually includes as many items of information as he feels are needed to give coverage to the study. As the survey instrument is reviewed, both internally and externally, it is condensed to give coverage to prime items. The guiding principle in shortening the survey form is: What use can be made of the items of information that will be collected? As is well known to NIRF members, short, concise questionnairs are more apt to be answered than long, rambling ones. Such factors as length of time it takes the respondent to complete the questionnaire, programming, machine processing and tabulations, printing, and other costs are considered at this stage.

2. Mailing

Almost 9 per cent of the institutions in the universe require that survey forms from the Office of Education be sent to a particular individual at an institution or to one institution which reports for a group of institutions. Thus, one form out of eleven needs special handling.

Although the mailroom tries to keep its mailing keys as up-to-date as possible, additions, changes, and drops are not always made in time to keep the mailing list current.

A very important problem often arises in the distribution of mail at the institution. From the responses we receive to our follow-up cards, we sometimes think there is a conspiracy among mail clerks in colleges and universities to direct survey forms to officials other than the ones designated on the envelopes. Too often do we receive the response, "What form? We have not received it. Please send a copy." Although what is said about mail clerks is said with "tongue in cheek," the fact remains that, if a form reaches an official other than the one designated on it, he is apt to be less than enthusiastic about completing it. This affects the length of time it takes to obtain a response and may contribute to the nonresponse problem.

3. Receipt control

Item nonresponse is the chief problem in the receipt control phase of the survey. In addition, if previous responses and institutional catalogues are not available, it is difficult to make a check of the external consistency of the data.

4. Follow-up of nonrespondents

The main problem here is that the reminder card may not reach the official for whom it was intended. Generally, once we forward additional sets of forms to officials who have responded to our reminder cards, these institutions respond at a very good rate. It is those institutions which do not respond at all that have a marked effect on the survey. When pressures of scheduling force us to resort to night letters and telephone calls to build up the rate of response for certain cells, time usually runs out before the cut-off date.

Experience with the collection of data for the Higher Education Salaries (HES) and Higher Education Basic Student Charges (BSC) surveys

The U.S. Office of Education began to collect HES and BSC data in 1957, in answer to a request by the National Federation of College and University Business Officers Associations. Through 1961, one survey form collected data on faculty and administrative salaries, tuition and required fees, room and board items, and on new buildings completed. The annual report emanating from the survey was called Higher Education Planning and Management Data (HEP&MD), and the source for all three types of data was the business manager. The institutional response rate to the HEP&MD survey went from 62 per cent in 1957 to 76 per cent in 1961. In 1962 separate forms were distributed for these data: one for collection of salary and new construction data; and one for collection of data on basic student charges. By 1963-64 the response rate had risen to 80 per cent of the institutions for the salary study and to 90 per cent of the institutions for the basic student charges study. For each response rate quoted here, the percentage of responding institutions represented a much higher percentage of the total higher education enrollment.

Analysis of responses received for each of the annual surveys shows that the response rate was lower for the small institutions (under 500 enrollment) than for the large institutions, that it was lower for the privately controlled than for the publicly controlled, and that both public and private 2-year institutions did not respond as well as 4-year institutions. Two efforts were made to determine the extent to which nonrespondents differed from respondents. In 1959-60 a follow-up was made of all the institutions which did not respond to the 1958-59 HEP&MD survey, using an abbreviated version of the survey form. The follow-up brought in data from 604 of 880 institutions (69 per cent). A comparison of the data from the follow-up group with the data obtained in the regular survey showed that in general the mean salaries and charges data from this group of institutions were lower than those of the earlier respondents. When the data of the two groups were compared, the following changes for the 124 cells were seen: Increases of under 4.1 percent occurred in 23 per cent of the cells; increases of 4.1 per cent and over occurred in 4 per cent of the cells; decreases of under 4.1 per cent occurred in 57 per cent of the cells; and decreases of 4.1 per cent and over occurred in 15 per cent of the cells.

This finding gave some credence to our assumption that the enrollment response rate is more meaningful than the institutional response rate. Since the larger and higher-paying and higher-charging institutions responded better than the smaller and lower-paying and lower-charging institutions, the effect of combining the follow-up data with those of the regular respondents was a general but not significant lowering of the means.

A substantiation of this finding was also obtained in a special follow-up of 1961-62 nonrespondents. Summary information was obtained from 97 of 105 nonrespondents who had been selected at random from the 508 nonrespondents to the 1961-62 survey. The data from these 97 were expanded to respresent the 508 institutions and then merged with the data from the original respondent group of 1,486 institutions. A comparison of the combined means with those of the original respondent group revealed that, on the average, the combined data means were approximately 2 per cent lower than the means of the 1,486 original respondents.

Titles of responding officials

When the HEP&MD survey was divided into two separate forms in 1962, the HES survey was sent to the business manager, as had been done previously, but the BSC survey was mailed to the registrar, a practice which is still continued. In each of the surveys we request the responding official to provide us with his name and position title. This information is useful in verifying possible data discrepancies, and it also provides us with an indication as to the variability in sources of data in institutions.

Even if we make allowances for the fact that there is quite a difference between the title of the individual who actually completes the form and the title of the individual whose name appears on it, an analysis of the position titles appearing on the 1962-63 HES and BSC survey forms should reveal the location of data sources within institutions.

Titles of officials who completed the HES survey in 1962-63 are shown in table 1, by institutional control and type. It is interesting that, although this survey was mailed to the business managers in institutions of higher education, only 40 per cent of 601 responses from public institutions and 56 per cent of 1,045 responses from private institutions were signed by titles designating business office officials. Inasmuch as the best source of contract salary and construction data is normally the business office of the institution, and since the original HEP&MD survey was undertaken at the request of the National Federation of College and University Business Officers Associations, one wonders whether the business manager receives the forms at all, or whether he, or institutional policy, assigns the responsibility to individuals outside the business office. It can be assumed that this transferring of responsibility contributes greatly to late responses and to nonresponses. The fact that at only approximately 50 percent of the 1,646 reporting institutions did the official for whom the survey form was intended complete the form, may also have a bearing on the reliability and validity of the data.

Much the same story is obtained with the titles of officials who completed the BSC survey in 1962-63 (see table2). This survey was mailed to registars in colleges and universities. Even by combining the number of registrars and admissions officers who completed the survey form, it may be seen that these two officials comprised approximately 43 per cent of those in 619 public institutions and 51 per cent of those in 1,108 private institutions. Business office personnel completed the BSC survey in 12 per cent of the public and 22 per cent of the private institutions.

Conclusion

The most important problem in the collection of data by questionnaires is the obtaining of reliable and valid data from respondents. If the data suffer from low reliability and low validity, then it makes very little difference whether one obtains a high or a low response rate. If one has a high degree of confidence in the reliability and the validity of the data, a good response rate becomes the second most important problem in data collection. In other words, the data should be representative of the various strata included in the universe of inquiry.

Length of time it takes to complete a questionnaire is very important to the success of a survey. This phase represents travail and cost not only for the sponsor but also for the respondent. Colleges and universities are on the receiving end of questionnaires from individuals, private organizations, and State and Federal agencies. It is an expensive, time-consuming process for them to try to meet these demands for information. And since all surveys seek reliable and valid data in the shortest time possible, the burden on institutions is heavy. However, recognizing that most of the survey investigations will "feed back" information which will be useful to some degree in decision making, the majority of college and university officials generally provide information to those who seek it.

In conclusion, a critical appraisal of this office's experience with the two surveys leads to the following suggestions with regard to data collection from a universe so diverse as that of higher education.

1. The data collection phase of a survey should be streamlined to obtain the maximum number of responses in the shortest possible time. To accomplish this phase requires the continued efforts of the survey sponsor and the survey respondents. Alerting higher education officials of the time they may expect certain surveys has helped in this regard. However, much work needs to be done both at the sponsor's level and at the institutional level to assure that mailed surveys reach the officials for whom they are intended.

2. Survey forms should not be cumbersome to the point that the number of items of information requested impose a severe time and cost problem to the respondents. The criterion to be used in selecting items to be included in a questionnaire is: how necessary are these items to the objectives of the survey? We have found it helpful to have the survey instrument reviewed within the Office and by outside groups. Pilot studies or pre-tests of questionnaires have helped considerably in knocking out the "nice-to-know" items. On the other hand, the review process sometimes enables other agencies or groups to ride "piggy-back" on a survey and thus obtain items of information which are not prime items for the survey sponsor but which are greatly needed by these other groups.

Table 1. -- Position titles of officials completing Higher Education Salaries survey, by institutional control and type: 1962-63

Position title	Total	Univs.	Liberal arts colleges	Teachers colleges	Tech. schools	Theol. schools	Other prof. schools	2-year colleges
Public institutions								
Total	601	91	91	127	16	--	8	268
Business Officer	241	41	54	61	5	--	4	76
President	102	1	7	27	2	--	1	64
Vice Pres.	28	12	5	3	1	--	--	7
Dean	67	2	5	6	1	--	--	53
Administrative Assistant	24	8	3	7	1	--	--	5
Director of Institutional Research	23	9	1	3	--	--	--	10
Registrar and Admissions	17	1	1	1	1		--	13
Other	69	13	10	13	5	--	--	25
Not given	30	4	5	6	--	--	--	15
Private institutions								
Total	1045	52	564	27	25	129	56	192
Business Officer	581	23	368	8	12	62	19	89
President	146	2	65	6	--	25	9	39
Vice Pres.	63	13	30	--	6	4	3	7
Dean	76	--	32	3	--	12	9	20
Administrative Assistant	31	6	15	1	2	--	3	4
Director of Institutional Research	4	1	--	--	2	--	--	1
Registrar and Admissions	27	--	5	3	--	7	6	6
Other	92	7	38	5	3	13	6	20
Not given	25	--	11	1	--	6	1	6

Table 2. -- Position titles of officials completing Basic Student Charges survey by institutional control and type: 1962-63

Position title	Total	Univs.	Liberal arts colleges	Teachers colleges	Tech. schools	Theol. schools	Other Prof. schools	2-year colleges
Public institutions								
Total	619	65	74	147	14	--	10	309
Registrar	231	40	37	57	4	--	3	90
Admissions Officer	38	6	2	17	1	--	--	12
Business Officer	76	9	13	36	3	--	2	13
Dean	101	1	1	11	2	--	--	86
President	64	3	4	12	--	--	2	43
Other	109	6	17	14	4	--	3	65
Private institutions								
Total	1108	49	596	26	31	146	85	175
Registrar	518	30	305	16	11	56	47	53
Admissions Officer	51	2	31	1	4	2	3	8
Business Officer	240	6	161	3	4	31	8	27
Dean	140	1	46	2	7	27	14	43
President	96	4	29	2	4	17	6	34
Other	63	6	24	2	1	13	7	10

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WAYNE STATE UNIVERSITY

The information explosion which has rocked the scientific and technical fields has been duplicated in the educational world. Each day scores of documents are added to the already unmanageable literature in the field. The problem of the university administrator is to locate the few items of direct interest to him without having to bother with the rest. Wayne State University has established a library to assist the administrative staff in this task, hoping to develop procedures through which service can be provided, not only to the Wayne staff, but also to college and university administrators throughout the nation.

The background of the library is briefly this. It was established three years ago, and at present the collection contains reports produced by the various offices and divisions of the university, publications relevant to national, state and area trends in higher education, copies of all bills pending and passed for the current session of the state legislature and public acts for past sessions covering the preceding five years, information relevant to national legislation affecting higher education, current books, periodicals and monographs dealing with higher education, and miscellaneous reference works. Although these documents might all be available in a large university library, they would be scattered throughout the collection or in individual collections, and the delays involved in locating and assembling the needed information would often be intolerable.

After Wayne had established this special library, it became clear that it should begin to function as an information center - that is, it should assemble the data into more usable form. So the library began to produce a weekly bulletin called the Trend Sheet which seeks to identify and analyze trends, and which serves as a vehicle of communication between the Office for Institutional Research and the President's staff.

Thus far, the library staff feels it has made available information which has been requested and, to a limited degree, has anticipated data needs through the Trend Sheet. However, it has recently become apparent that there remains a larger, as yet unmet, need. Of the publications coming into the library, many went unnoticed by those who were most interested in the contents. Articles in journals were usually lost for all time because of the totally inadequate indices in this field. In addition, administrators often plowed through quantities of irrelevant material to get the few items they needed, or ignored much of the current literature because of the pressure of time. Clearly then, the library was not getting all relevant and timely information on a continuing basis to people who needed it. Major publications in the field could be directed to some of the administrators whose particular interests were well known by the librarian, but this personal service could only be extended to a few people and could not include a thorough coverage of articles in journals, newspapers, or special reports.

In an effort to determine the size of the problem the staff examined materials entering the library over a four-month period, identifing approximately 900 documents of interest to at least one of the members of the administrative staff.

What the library proposed to do was to search through all incoming materials and direct them to staff members who needed them. After examining various techniques the library staff concluded that a procedure known as SDI (The Selective Dissemination of Information), using electronic data processing equipment, could do the most efficient, comprehensive and effective job. This procedure purports to simulate the human browsing activity. If a person were checking publications for information of interest to him, he would probably look at the table of contents. If an article or chapter looked interesting, he would turn to it and scan the abstract, read the summary or conclusion, note the subheadings, or read through the first paragraph to judge if the document would be worth reading all the way through.

The SDI program assumes that the decision to read the article is based on the finding of key words which describe the browser's interest area. For example, an abstract containing the words "automation," "data processing," "computers," and "mechanization" might indicate an article of potential use to some member of the staff. These words are a subset of all words or phrases which could be used to describe his current interests. The presence of certain words suggest the article is of interest to the reader.

What the library has suggested then is that those members of the administration who would like to be kept aware on a continuing basis of new literature relevant to their particular interests supply the library with lists of words which define their current professional interests. These words make up interest profiles which are stored on magnetic tape in the Computer. Every document entering the library is identified by title, author and source, an abstract is prepared for it, and additional index words are assigned if necessary. All this information is stored in the computer, also. The computer then compares each profile with each abstract, and if a sufficient number of terms are common to both, the abstract is printed by the computer and sent to the profile owner. In this way it is possible for every one of the library's users to have the current literature in his field scanned and only those articles of direct interest to him brought to his attention.

The first step in the SDI program was to obtain interest profiles of the library's users. This program permits profiles of up to 60 words in length, and a user may have as many as 36 profiles. Appendix A contains a profile for the director of the Office for Institutional Research. There are two types of words in this profile:

1. The first term "administrat" is a root term. That means a match will occur if "administration," "administrator," "administrators," or "administrative" appears in the abstract. All root terms can be identified by a parenthesis sign in the type column of the profile.

2. The second term "automation" is an exact term. A match will occur only if the word "automation" appears in the abstract. All exact terms can be identified by a comma in the type column of the profile.

The fourth word is a proper name by which it is possible to indicate a desire for publications of a particular author. The ninth term consists of two words, "cost studies." With this program it is possible to indicate an interest in words appearing in a certain sequence. In terms like "critical path" and "institutional research" this feature is particularly important since the words appearing separately might convey entirely different meanings. It is also possible to have a profile term consisting of numbers. For example, the Higher Education Bills, S 600 and HR 3221, could be included in a profile.

Each profile has a hit level associated with it. The hit level provides a measure of control over how many document notices a user will get and how much similarity must exist between the abstract and the profile before a notice is sent. The sample profile shown here has a hit level of 03. The profile terms must have a combined weight of 3 or more before a notice will be printed. With this profile, an abstract containing the terms "administration," "automation," and "billing" would have a combined weight of 3; thus, a notice would be provided. The single term "institutional research" in an abstract would be sufficient to cause a match with this profile because its weighting is equal to the hit level.

Each term has an assigned weight which may vary from +9 to -9. The higher the positive weight the more important the word is. The negative weights reflect little interest in documents containing that term. So far negative weights have been used to designate journals the user always wants to browse through personally and feels that he doesn't need any notice from those publications.

The hit level of the profile and weighting of each term are chosen by the user. They can be easily adjusted, and terms can be added or deleted with equal ease.

The second step in the SDI program is processing input. This system is designed to deal only with literature of college and university administration; it does not cover content areas. That is, the staff would include articles on how to administer a speech department but not include articles on modern linguistics. The distinction is not always perfectly clear, and the library prefers to err on the side of accepting borderline articles.

The library staff includes on a regular basis all journals which deal in whole or part directly with higher education. In addition this system readily allows for including a single issue or a single article from an issue of a particular journal. Books, monographs, special reports, etc., and at this time, only one newspaper -- The New York Times -- are also covered.

All materials entered into the SDI system are abstracted or extracted into summaries of about 100 words. Each abstract contains the author's name, the title of the document, the publication source, the date and the number of pages, as well as the abstract itself with comments if necessary. Comments might include the information that charts or graphs are included.

The abstracts are automatically indexed by the computer and stored on magnetic tape. Words from the abstracts are compared with all profiles in the system, and in those cases where enough words match, document notices are printed on continuous form in mailing sequence. Note that the words which caused the match are printed at the top of the document notice so each user knows why he received each individual notice (see Appendix B). Frequencies of words which matched on documents disseminated are obtained by the program and can be used for control and evaluation purposes. For example, one user seemed to be getting far too many notices that were not directly relevant to his interest. The library obtained a listing of all the words which matched on each notice and identified those which did not seem to be sufficiently selective. This suggested which terms to eliminate. By deleting some, assigning a higher weight to others, and adjusting the hit level, the staff was able to produce a satisfactory profile. The process of adjusting profiles is much more an art than a science. Since there are no firm guidelines, we presently use a trial and error method. In additon, each user differs. Some are willing to tolerate more irrelevant notices because they want to be sure that they don't miss relevant documents and are willing to flip through a few extra cards while others don't mind missing a few notices if they won't be bothered with irrelevant ones. The SDI system can accommodate both kinds of users.

This question then arises: How many useless notices are tolerable? Since this field uses a particularly inexact vocabularly, some matches are produced where one meaning is intended and another is found. It is difficult to say how many bad notices the user will permit. Other SDI applications have found that if two-thirds of the notices are good, the system is performing satisfactorily. Such results usually require four to five profile revisions.

The system described so far is that of a current awareness program which provides exploration of the accumulated documents. If, for example, a user assumes new responsibilities and his interests change, he may want all materials on his new interests which have been entered into the SDI system. This service can easily be provided. In addition, the library intends to produce author and title indices to make manual searches possible. The titles will be indexed by every significant word appearing in them, and non-descriptive titles will be indexed using the original and a rewritten title or additional descriptive terms. Future plans also include the production of an abstract journal.

Some of the SDI system described is operational, some still in the planning stages. At present a pilot program with 20 administrators is being run to identify most of the operational problems and to discover their solutions. As yet no formal evaluation has been made, but user satisfaction appears high. The library expects to publish the first index this month and is planning to provide this service to a few people outside Wayne to test problems of communication. More and more of Wayne's administrators will also be included in the program.

In summary then, the library proposes to utilize SDI to handle many of the information needs of higher education administrators and institutional research personnel. SDI should aid in providing current awareness service, retrospective computer searches and tools for manual searching. We are presently seeking financial support for this program in order to permit increased participation.

Appendix A

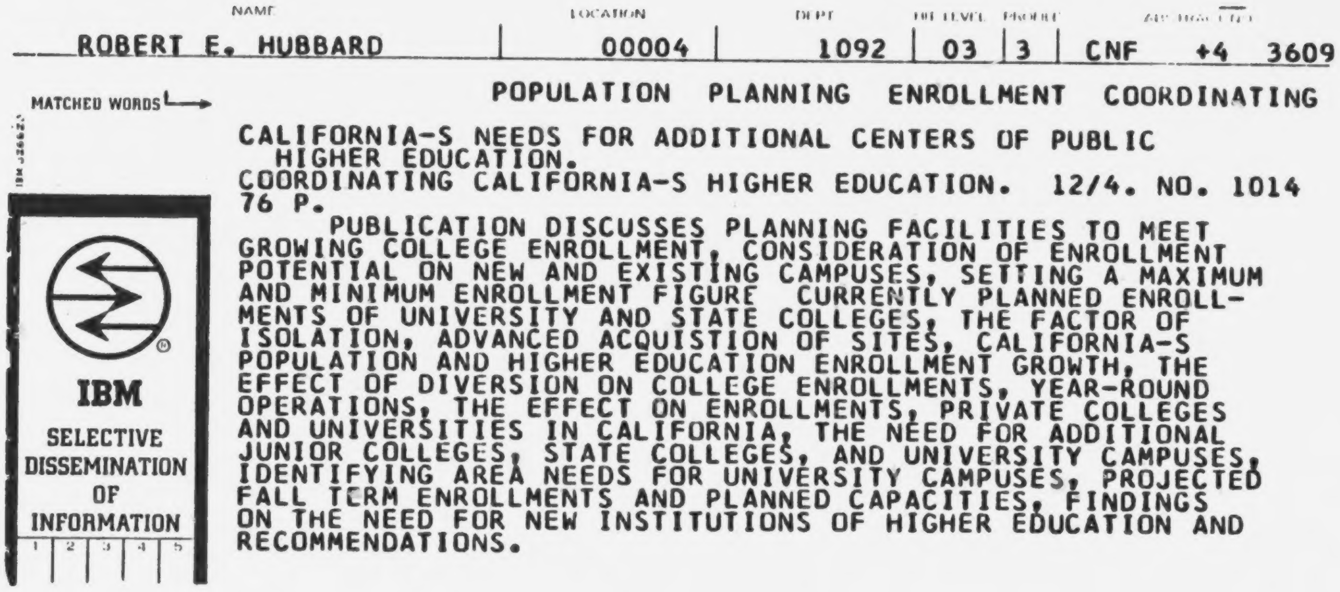
LIST	S. D. I. PROFLIE	DATE MARCH 22, 1965

LOC.	DEPT.	SER.	PROF.	NAME	LOCATION	SECURITY ABCDE	HIT LEVEL
00004	1092	092843	3	Robert E. Hubbard	1092 Mackenzie Hall		03

KEYWORD TYPES , - EXACT TERM (- ROOT TERM

TYPE	WT.	PROFILE TERM	TYPE	WT.	PROFILE TERM
(	1	ADMINISTRAT	(	1	MATHEMATICAL MODEL
,	1	AUTOMATION	,	1	MECHANIZATION
,	1	BILLING	,	1	MICHIGAN BOARD OF EDUCATION
,	1	BRUMBAUGH	(	1	NETWORK
(	1	BUDGET	(	1	ORGANIZATION CHART
(	1	COMPENSATION	(	1	PERSONNEL
(	1	COMPUTER	,	2	PERT
(	1	COORDINAT	,	1	PLANNING
,	1	COST STUDIES	,	1	POLICIES
,	1	COST STUDY	,	1	POLICY
,	1	COUNCIL OF STATE COLLEGE PRESIDENTS	,	1	POPULATION
,	2	CPM	(	1	PREDICTION
,	1	CRITICAL PATH	(	1	PROGRAM
,	1	DATA PROCESSING	(	1	PROJECTION
(	1	DECISION	,	1	REGISTRATION
(	3	DECISION MAK	,	1	RUSSELL
,	1	DOI	(	1	SABBATICAL
(	1	ENROLLMENT	(	1	SALARIES
(	1	FORECAST	,	2	SCHEDULING
(	1	FRINGE BENEFITS	,	1	SCIENTIFIC MANAGEMENT
,	3	INSTITUTIONAL RESEARCH	(	1	SELF-STUDY
,	1	INTER-INSTITUTIONAL	(	1	SIMULAT
(	1	LOAD	,	1	STATE BOARD OF EDUCATION
,	1	MANAGEMENT	,	1	SYSTEMS

Appendix B



NAME	LOCATION	DEPT	RET LEVEL	PROFILE	ABSTRACT NO
ROBERT E. HUBBARD	00004	1092	03	3	CNF +4 3609

MATCHED WORDS → POPULATION PLANNING ENROLLMENT COORDINATING

```
CALIFORNIA-S NEEDS FOR ADDITIONAL CENTERS OF PUBLIC
  HIGHER EDUCATION.
COORDINATING CALIFORNIA-S HIGHER EDUCATION.  12/4. NO. 1014
76 P.
     PUBLICATION DISCUSSES PLANNING FACILITIES TO MEET
GROWING COLLEGE ENROLLMENT, CONSIDERATION OF ENROLLMENT
POTENTIAL ON NEW AND EXISTING CAMPUSES, SETTING A MAXIMUM
AND MINIMUM ENROLLMENT FIGURE  CURRENTLY PLANNED ENROLL-
MENTS OF UNIVERSITY AND STATE COLLEGES, THE FACTOR OF
ISOLATION, ADVANCED ACQUISTION OF SITES, CALIFORNIA-S
POPULATION AND HIGHER EDUCATION ENROLLMENT GROWTH, THE
EFFECT OF DIVERSION ON COLLEGE ENROLLMENTS, YEAR-ROUND
OPERATIONS, THE EFFECT ON ENROLLMENTS, PRIVATE COLLEGES
AND UNIVERSITIES IN CALIFORNIA, THE NEED FOR ADDITIONAL
JUNIOR COLLEGES, STATE COLLEGES, AND UNIVERSITY CAMPUSES,
IDENTIFYING AREA NEEDS FOR UNIVERSITY CAMPUSES, PROJECTED
FALL TERM ENROLLMENTS AND PLANNED CAPACITIES, FINDINGS
ON THE NEED FOR NEW INSTITUTIONS OF HIGHER EDUCATION AND
RECOMMENDATIONS.
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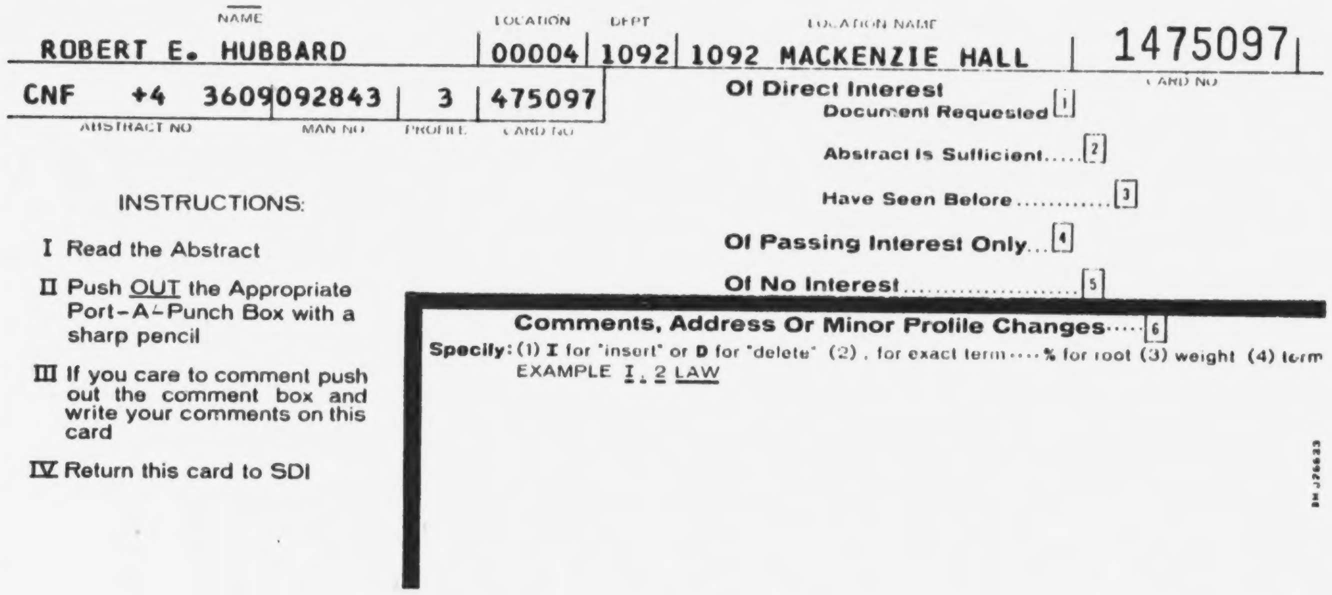
IBM
SELECTIVE
DISSEMINATION
OF
INFORMATION

1 2 3 4 5



NAME	LOCATION	DEPT	LOCATION NAME	CARD NO
ROBERT E. HUBBARD	00004	1092	1092 MACKENZIE HALL	1475097

ABSTRACT NO	MAN NO	PROFILE	CARD NO
CNF +4 3609	092843	3	475097

Of Direct Interest

Document Requested ☐ 1

Abstract Is Sufficient..... ☐ 2

Have Seen Before............ ☐ 3

Of Passing Interest Only... ☐ 4

Of No Interest...................... ☐ 5

INSTRUCTIONS:

I Read the Abstract

II Push OUT the Appropriate Port-A-Punch Box with a sharp pencil

III If you care to comment push out the comment box and write your comments on this card

IV Return this card to SDI

Comments, Address Or Minor Profile Changes..... ☐ 6

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APPENDIX

PROGRAM
FORUM PARTICIPANTS

PROGRAM

FIFTH ANNUAL NATIONAL INSTITUTIONAL RESEARCH FORUM

Monday, May 3

3:00 - 8:00 p.m. - Registration

8:00 p.m. - General Session

Presiding: Stuart Grout, Chairman
Planning Committee
Director of Academic Services
Boston University

Welcoming Remarks:

Tom Shea, Chairman
Local Arrangements
Director, Office of Institutional Research
State University of New York

Karl D. Hartzell
Administrative Officer
State University of New York at Stony Brook

Address: Institutional Research and Institutional Policy

Allan M. Cartter
Vice President
American Council on Education

Tuesday, May 4

9:00 - 10:30 a.m. - Clinics on Institutional Research Methodology, Section 1 (Choice of one of the following)

A. Faculty Load Studies

Robert McClintock, Director
Division of Institutional Research
University of Maryland

B. Enrollment Projections for Public Institutions

L. Joseph Lins, Professor and Coordinator
Institutional Studies
University of Wisconsin

C. Enrollment Projections for Private Institutions

Donald L. Oliver, Director of Admissions
Boston University

D. Financial Analyses

Leroy E. Hull, Director
Bureau of Institutional Research
Indiana University

E. Research Related to Campus Planning

E. F. Hallenbeck, Director
Institutional Research and Planning
University of Rhode Island

F. Studies of College Students

J. A. Davis and Associates
Research Psychologists
Educational Testing Service

G. Institutional Research on Curriculum

John A. Centra, Instructor
Office of Institutional Research
Michigan State University

H. Using the Document Scanner for Institutional Research

James Colney, Director
T. C. A. Center for Higher Education
George Peabody College for Teachers

I. Computers and Simulation as Aids to Educational Planning and Decision Making

Section 1 - Joseph N. Froomkin
Marketing, Plans and Controls
Data Processing Division
International Business Machines Corp.

Section II - G. Truman Hunter, Administrator
Educational Program
Data Processing Division
International Business Machines Corp.

11:00 a.m. - 3:30 p.m. - Contributed Papers, Section I (Choice of one area)

AREA I - Faculty

Host: Clarence Bagley, Coordinator
Office of Institutional Research
Washington State University

Faculty Mobility and Productivity and Achievement

Elwin F. Cammack
Office of Institutional Research
Weber State College

Faculty Perceptions and Changing Institutional Press

Arthur W. Chickering
Coordinator of Evaluation
Goddard College

The Holistic Description of a College Faculty

James Steve Counelis
Director of the Extended Day Program
Chicago Teachers College South

Appraisal of Criteria for Evaluation of Administrative Performance

Richard R. Perry, Director
Office of Institutional Research
University of Toledo

Suggested Grade Distributions

R. J. Western, Chief
Research Division
Directorate of Evaluation
United States Air Force Academy

AREA II - Models and Methods

Host: Stanley Ikenberry
Dean of Human Resources & Education
West Virginia University

Methods for Future Enrollment Estimation Under Trimester Calendar

Herbert R. Kells, Assistant Dean
State University of New York at
Binghamton

Methodology for Planning

Vernon C. Mickelson
Director of Institute Planning
Case Institute of Technology

Mathematical Models of Space Utilization

Donovan Smith
Specialist in Physical Planning
Analytical Studies Office
University of California

The Methodological Complex

Irma T. Halfter, Director
University Testing and Evaluations
DePaul University
and
Edward M. Stout, Registrar
DePaul University

Using a Matrix of Coefficients as a Planning Tool

Sidney Suslow
Institutional Research Officer
University of California

AREA III - Students and Curriculum

Host: Joe L. Saupe
Assistant Director of
Institutional Research
Michigan State University

An Experimental Investigation of Drops and Adds

Charles F. Elton
Dean of Admissions and Registrar
University of Kentucky

A Qualitative System for Curricular Reform

George E. Grauel
Director of Institutional Planning
John Carroll University

Comparison of Graduates at the University of Pittsburgh (September 1959) Under Accelerated Program

Hilda Jones, Staff Associate
Planning and Policy Coordination
University of Pittsburgh

The Academic Success of Transfer Students

P. Kenneth Morse
Director of Evaluation Services
Eastern Michigan University

Characteristics and Changes in 1961 Class, Baylor University

Joseph V. West, Director
Office of Institutional Research
Baylor University

3:45 - 4:45 p.m. - Contributed Papers, Section II (Choice of one area)

AREA I
AREA II
AREA III

5:00 - 6:00 p.m. - Topics of Special Interest (Choice of one topic)

A. Problems in Data Collection

Louis D'Amico, Specialist
College & University Business Administration
U.S. Office of Education

B. Information Exchange (Free wheeling discussion of I. R. Problems)

James Montgomery
Director of Institutional Research
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C. Satisfying Information Needs of Offices for Institutional Research

Karen Baird
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D. Tour of the Computing Center

Robert Cyphers, Director
University Records and Studies
State University of New York at Stony Brook

8:30 p.m. - Business Meeting

Wednesday, May 5

9:00 - 10:30 a.m. - Clinics on Institutional Research Methodology, Section II (Choice of one)

A, B, C, D, E, F, G, H, and I

11:00 a.m. - 12:45 p.m. - Contributed Papers (Continuation of Section II)

AREA I
AREA II
AREA III

2:15 p.m. - Adjournment

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